



## The validity of the Substance Use Risk Profile Scale (SURPS) among Australian adolescents



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### HIGHLIGHTS

- The SURPS is valid for identifying adolescents at high-risk for substance use.
- The SURPS is valid for identifying adolescents with emotional problems.
- The SURPS is valid for identifying adolescents with behavioural problems.
- SURPS subscale scores for Australian and UK adolescents were similar.
- Hopelessness was not associated with illicit drug use in the Australian sample.

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### ABSTRACT

**Aims:** This study investigated the validity of a brief personality screening measure for substance use in adolescents, the Substance Use Risk Profile Scale (SURPS), among Australian adolescents.

**Design and participants:** A total of 527 adolescents (mean age: 13.38 years,  $SD = 0.43$ ) from seven Australian schools were assessed at two time points 24 months apart. The concurrent and predictive validity of the SURPS was determined using a series of linear and logistic regressions, and was compared to the results in a United Kingdom (UK) sample. SURPS subscale scores for the Australian population were also reported and compared to those in the UK.

**Findings:** Overall, the SURPS subscale scores for Australian adolescents were similar to those for adolescents from the UK. Tests of concurrent and predictive validity in the Australian sample demonstrated that the all four personality profiles – Hopelessness (H), Anxiety Sensitivity (AS), Impulsivity (IMP), and Sensation Seeking (SS) – were related to measures of substance use and other behavioural and emotional characteristics. In addition, all the predicted specific prospective relationships between the personality profiles and particular substance use and other behavioural problems were confirmed except that H was not associated with illicit drug use. Overall, the results were similar between the Australian and UK samples.

**Conclusions:** The SURPS is a valid and useful measure for identifying Australian adolescents at high-risk for substance use and other emotional and behavioural problems. Implications for prevention are discussed.

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### 1. Introduction

Each year, a significant proportion of adolescents put themselves at risk of harms related to alcohol or illicit drug use worldwide (World Health Organisation, 2011). In Australia, 51% of adolescents aged 12–17 report consuming alcohol in the past year, 12.7% report using cannabis and 6.5% report using an illicit drug other than cannabis (White &

Bariola, 2012). The high prevalence of substance use among adolescents is particularly concerning, given that early onset of use has been associated with a range of consequences, including the development of substance use and mental health disorders, poor school performance, and juvenile offending (Patton et al., 2007; Grant et al., 2006; Behrendt, Wittchen, Hoyer, Lieb, & Beesdo, 2009). These disabling consequences can persist into adulthood, and are associated with considerable burden and costs to society (Collins & Lapsley, 2008).

To alleviate these problems, effective prevention is essential. In recent years we have seen an emergence of successful prevention programs to reduce substance use and associated harms (Fabrizio, Silvia,

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Elisabetta, & Daria, 2014; Teesson, Newton, & Barrett, 2012; Foxcroft & Tsertsvadze, 2012; Conrod et al., 2013; Newton, Teesson, Vogl, & Andrews, 2010; Newton, Vogl, Teesson, & Andrews, 2009; Conrod, Castellanos, & Strang, 2010). These span from universal programs, delivered to a whole population regardless of level of risk, to selective programs, targeted to those most at risk of developing substance use problems (Foxcroft, 2014). An integral component of selective prevention programs is the identification of individuals at increased risk. One area of risk shown to be particularly predictive of substance misuse is personality (Conrod et al., 2010; Woicik, Stewart, Pihl, & Conrod, 2009; Whelan et al., 2012; Mackie, Castellanos-Ryan, & Conrod, 2011; Conrod, Castellanos, & Mackie, 2008a; Castellanos & Conrod, 2006; Peeters et al., 2014; Jaffee & D'Zurilla, 2009). Four personality profiles have been identified in this respect; the internalising profiles of Anxiety Sensitivity and Hopelessness, and the externalising profiles of Sensation Seeking and Impulsivity. Each of these profiles is associated with specific patterns of substance misuse, motivations for use, and vulnerabilities to comorbid psychopathology (Woicik et al., 2009; Castellanos-Ryan, O'Leary-Barrett, Sully, & Conrod, 2013a; Cooper, Frone, Russell, & Mudar, 1995; Conrod, Pihl, Stewart, & Dongier, 2000a; Comeau, Stewart, & Loba, 2001). Anxiety sensitivity is described as a fear of anxiety-related physical sensations (Reiss, Peterson, Gursky, & McNally, 1986) and has been shown to be associated with coping motives for substance use, high levels of drinking problems, other drug use, and anxiety and panic symptoms among adults (Conrod et al., 2000a; Stewart & Kushner, 2001; Conrod, Pihl, & Vassileva, 1998; Zvolensky, Stewart, Vujanovic, Gavric, & Steeves, 2009; Stewart et al., 2001). Anxiety sensitivity has been associated with lower levels of substance use among young adolescents (Krank et al., 2011), indicating it may be protective in early adolescence, but become a risk factor for substance misuse at later stages of development (Krank et al., 2011). Hopelessness, on the other hand, has been shown to be associated with early onset of alcohol use, motivations to drink to reduce negative affect, and symptoms of depression in adulthood (Conrod et al., 2010; Woicik et al., 2009; Conrod & Woicik, 2002). Hopelessness refers to a tendency towards low mood, worthlessness and negative beliefs about oneself, the world and the future (Castellanos-Ryan & Conrod, 2006; Conrod et al., 2000b). The two externalising profiles, Impulsivity and Sensation Seeking, have been linked to substance use and other high risk, anti-social behaviours (Woicik et al., 2009; Conrod, Castellanos, & Mackie, 2008b; Castellanos-Ryan, Rubia, & Conrod, 2011; Krueger et al., 2002). Impulsivity is associated with rapid decision making and action and poor response inhibition (Conrod et al., 2010; Castellanos-Ryan et al., 2011; Krueger et al., 2002; Baumeister & Vohs, 2004) whereas sensation seeking is associated with an elevated need for stimulation and intolerance to boredom (Woicik et al., 2009; Arnett, 1994).

Based on this research, the Substance Use Risk Profile Scale (SURPS) was developed to assess variability on the four personality profiles (Woicik et al., 2009). This 23-item self-report scale has shown to be easily administered in large adolescent samples. The SURPS items measure personality and not substance use, therefore enabling the identification of adolescents at risk for substance use and related problems prior to the onset of use. This unique feature of the SURPS is of particular relevance to selective prevention programs. Importantly, the psychometric properties of the SURPS have been established and replicated, with studies demonstrating good test–retest reliability, internal consistency, and concurrent and predictive validity among adolescents and young adults (Woicik et al., 2009; Castellanos-Ryan et al., 2013a; Krank et al., 2011; Lammers, Kuntsche, Engels, Wiers, & Kleinjan, 2013; Malmber et al., 2010). A recent longitudinal study in the UK examined the sensitivity and specificity of the SURPS and demonstrated that all four profile scales were related to substance use and the development of profile-specific behavioural and emotional problems (Castellanos-Ryan et al., 2013a).

Taken together, these previous studies indicate that the SURPS can be a reliable tool for identifying high-risk personality profiles among

adolescents with the aim of implementing selective programs to prevent substance misuse and other emotional and behavioural problems. In addition, the SURPS has demonstrated high cross-cultural validity, as evidenced by research carried out in the UK (Castellanos-Ryan et al., 2013a), The Netherlands (Lammers et al., 2013; Malmber et al., 2010), Canada (English and French versions) (Krank et al., 2011; Castonguay-Jolin et al., 2013), Mexico (Robles-Garcia et al., 2014), China (Siu, 2011), Sri Lanka (Ismail, De Senevirante, Newcombe, & Wanigarante, 2009), and Japan (Omiya, Kobori, Tomoto, Igarashi, & Iyo, 2015). Given the prevalence of substance use and the need for effective prevention among adolescents in Australia, the next important step is to examine the psychometric properties of the SURPS in an Australian adolescent sample.

The aims of this study are to: 1) examine the concurrent and predictive validity of the SURPS in relation to substance use and other emotional and behavioural problems among Australian adolescents; 2) report SURPS subscale scores in an Australian sample; and 3) compare the findings to a previously studied UK sample. Comparisons with the UK are of particular interest due to the similar drinking cultures and same legal purchase age of alcohol in Australia and UK (World Health Organisation, 2014). In addition to these broad aims, we propose a number of hypotheses in line with previous research (Castellanos-Ryan, O'Leary-Barrett, Sully, & Conrod, 2013b): i) Hopelessness will be associated with substance use, drinking problems, and depression symptoms; (ii) Anxiety sensitivity will not be associated with increased substance use at this age, but will be associated with emotional problems; (iii) Impulsivity will be associated with substance use, as well as hyperactivity and conduct problems; and (iv) Sensation Seeking will be related to substance use and hyperactivity. This will be the first study to examine these relationships in Australia.

## 2. Method

### 2.1. Participants and procedure

The sample was derived from the Climate and Preventure (CAP) study, a cluster randomised controlled trial designed to prevent substance use and related harms. The study was conducted in 27 schools in Sydney and Melbourne, Australia between 2012 and 2015. A detailed description of the study participants and procedure is published elsewhere (Newton, Teesson, Barrett, Slade, & Conrod, 2012). The present study focuses on baseline and 24 month follow-up data from the seven control schools, to avoid any contaminating effect of the interventions. Of these schools, five were private schools (including both Independent and Catholic high schools not under the ownership of the government) and two were public schools (those governed by the Department of Education and Communities).

Information and consent forms were sent home to parents ( $n = 758$ ) of all Year 8 students at participating schools. Eighty one percent ( $n = 612$ ) who received parental consent and gave consent themselves were eligible to participate. Of the eligible students, 86% ( $n = 527$ ) from the seven schools completed the baseline assessment (67% female, mean age: 13.38 years ( $SD = 0.43$ )). Students were surveyed, at baseline and 24 month follow-up, in a classroom setting using self-report questionnaires. Student responses were linked over time using a unique identification code to ensure confidentiality. Six schools completed the survey online and one school via paper and pen.

The research protocol, including informed consent procedures, was approved by the University of New South Wales Human Research Ethics Committee, the Sydney Catholic Education Office, and the New South Wales Department of Education and Communities. The trial is registered with the Australian New Zealand Clinical Trials Registry (ACTRN12612000026820).

## 2.2. Measures

### 2.2.1. Demographics

Demographic data were obtained including gender, age and country of birth.

### 2.2.2. Substance Use Risk Profile Scale (SURPS)

The SURPS is a 23-item questionnaire which assesses personality risk for substance abuse and dependence along four dimensions: Sensation Seeking (SS), Impulsivity (IMP), Anxiety Sensitivity (AS) and Hopelessness (H) (Wojcik et al., 2009). Participants are asked to indicate the extent to which they agree with each item (e.g. “I usually act without stopping to think”) on a 4 point scale (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree). Total scores were calculated for each of the four subscales. As one of the SS items (“I am interested in experience for its own sake, even if it is illegal”) has been shown to cross-load onto the impulsivity factor in factor analyses of the SURPS carried out in previous studies (Castellanos-Ryan et al., 2013a; Krank et al., 2011), a confirmatory factor analysis (CFA) was conducted in the current sample using Mplus v.7v11. Results from the CFA (see supplementary material) confirmed the same pattern of results therefore substantiating the deletion of this SS item. As such a revised SS score (SS-R), which did not include this item, was used for all analyses in this study. The SURPS subscales demonstrated acceptable to good internal consistency reliability in our sample (NT:  $\alpha = 0.86$ ; AS:  $\alpha = 0.62$ ; IMP:  $\alpha = 0.78$ ; SS-R:  $\alpha = 0.67$ ).

### 2.2.3. Alcohol use

Age of onset was assessed by asking participants to report at what age they had their first alcohol drink. Drinking status was examined by asking students whether they had consumed a standard alcoholic drink in the past six months (“yes” or “no”). Quantity  $\times$  Frequency of alcohol consumption was assessed by asking students how often they consumed a standard alcoholic drink in the past six months according to a six-point scale (“never” to “daily or almost daily”) and the number of standard alcoholic beverages they typically consumed on one drinking occasion in the past six months according to a six-point scale (“none” to “10 or more”). Binge drinking was assessed by asking students to indicate how often they consumed five or more standard drinks on one occasion in the past six months on the same six-point scale (“never” to “daily or almost daily”). Due to very low cell counts, a binary variable was created (never vs. all others).

### 2.2.4. Alcohol harms

Alcohol related harms, experienced in the past six months, were assessed using an abridged version of the Rutgers Alcohol Problem Index (White & Labouvie, 1989) used in previous studies of this kind (Conrod et al., 2013; Conrod, Castellanos, & Mackie, 2008c). The nine items in this abridged scale were summed to create a composite score of alcohol harms, with higher scores reflecting more harms. The scale was dichotomised into “no harms” and “any” harms, due to the low prevalence of harms reported with this group. The alcohol harms index demonstrated excellent internal consistency reliability in our sample ( $\alpha = 0.85$ ).

### 2.2.5. Tobacco, cannabis and other drug use

Tobacco, cannabis and other drug use were assessed by asking participants whether or not they had used tobacco (cigarettes), cannabis, or any other drugs (e.g. methamphetamine and ecstasy) in the past six months, respectively.

### 2.2.6. The Strengths and Difficulties Questionnaire (SDQ) (Goodman, Meltzer, & Bailey, 1998)

The SDQ is a youth mental health instrument that assesses common areas of emotional and behavioural difficulties with good reliability and validity in adolescents across a number of countries (Goodman et al.,

1998; Bourdon, Goodman, Rae, Simpson, & Koretz, 2005; Goodman, 2001; Hawes & Dadds, 2004; Muris, Meesters, & van den Berg, 2003). The instrument contains 25 items, divided into five scales: Hyperactivity, Emotional Symptoms, Conduct Problems, Peer Problems and Pro-social. Each item (e.g. “I get very angry and often lose my temper”) was queried on a three-point scale (0 = not true, 1 = somewhat true, 2 = certainly true; 5 were reverse-scored). Each scale was summed to create a total score ranging from 0 to 10. To allow for comparisons with the UK SURPS validation study (Castellanos-Ryan et al., 2013b), all but the Peer Problems subscale were of interest in present study. The SDQ subscales demonstrated acceptable to good internal consistency reliability in our sample (SDQ Emotion:  $\alpha = 0.73$ ; SDQ Conduct:  $\alpha = 0.59$ ; SDQ Hyper:  $\alpha = 0.74$ ; SDQ Pro Social:  $\alpha = 0.61$ ).

### 2.2.7. The Brief Symptom Inventory (BSI) (Derogatis, 1993)

The BSI is a brief psychological distress symptom scale, comprising nine symptom scales. The BSI has high reliability and is comparable to the Beck Depression Inventory and the Brief Psychiatric Rating Scale in regards to its accuracy in detecting depression symptoms in adolescents (Derogatis & Melisaratos, 1983; Sahin, Durak Batigun, & Ugurtas, 2002; Morlan & Tan, 1998). Consistent with the UK SURPS validation study (Castellanos-Ryan et al., 2013b), the current study included only the six item depression scale. Participants were asked to report how much they had experienced symptoms (e.g. “feeling lonely”) in the past six months on a five-point scale (0 = not at all, 1 = a little bit, 2 = moderately, 3 = quite a bit, 4 = often). The scale was summed to create a total score ranging from 0 to 24. Scores for the depression scale were summed, with higher scores indicating greater distress. The BSI depression scale demonstrated near excellent internal consistency reliability in our sample ( $\alpha = 0.89$ ). Due to policies of relevant ethics committees, the BSI and SDQ were only measured in students from private schools in the study ( $n = 432$ ).

## 2.3. Data analysis

Linear and logistic regressions were used to examine whether the SURPS subscales were associated with concurrent as well as future measures of substance use and emotional and behavioural problems. Besides controlling for the effects of the other personality traits (all personality traits are entered into each model at the same time), all analyses controlled for the effects of age and gender as they have previously been shown to be significantly associated with substance use, as well as other emotional and behavioural problems, in adolescence (White & Bariola, 2012; Best et al., 2001; Heyerdahl, Kvernmo, & Wichstrom, 2004). In addition, prospective analyses controlled for the effects of baseline outcome measures. For linear and logistic regressions, estimates of  $R^2$  are provided as a measure of multivariate effect size, where an  $R^2$  of 0.02, 0.13, and 0.26 are considered a small, moderate, and large effect size (Cohen, 1992). For logistic regressions, odds ratios provide an indication of how large an effect is, with values ranging from 1.00 to 1.50, indicating a small effect and 3.0 or above representing a large effect (Haddock, Rindskopf, & Shadish, 1998). Full-information maximum likelihood (FIML) estimation was used to handle missing data. FIML uses all available information to estimate parameters rather than deleting cases with missing data is superior to traditional methods (i.e., listwise/pairwise deletion) (Schafer & Graham, 2002) and has been employed in numerous studies examining substance use outcomes in adolescents (Brown, Catalano, Fleming, Haggerty, & Abbott, 2005; Henry et al., 2011; Ichiyama et al., 2009). Intraclass correlations (ICCs) were calculated to determine the extent of clustering between versus within schools. ICCs were calculated by obtaining estimates of variance components using the General Linear Model (GLM) procedure in IBM SPSS Statistics. As the ICCs on the outcome variables were all under 0.10, consistent with recommendations in the literature (Lee, 2000), no adjustments for clustering were made.

### 3. Results

#### 3.1. Sample characteristics

At baseline, 67% ( $n = 351$ ) of the sample were female and participants' ages ranged from 12 to 15 years, with a mean age of 13.38 years ( $SD = 0.43$ ). The majority of students were born in Australia (89%). The UK sample, with which we make comparisons in the following analyses, had a total of 1057 adolescents (42% female) with a mean age of 13.66 years ( $SD = 0.32$ ) and a variety of ethnic backgrounds (43% White British) (Castellanos-Ryan et al., 2013b).

#### 3.2. Attrition

Eighty four percent of students completed surveys 24 months post baseline ( $n = 444$ ). Attrition was predicted by baseline drinking ( $p < 0.01$ ), binge drinking ( $p < .001$ ) and gender ( $OR = 1.99$ ; 95% CI, 1.22 to 3.23), indicating that baseline drinkers, binge drinkers and males were less likely to be followed-up at 24-months. However, attrition was not predicted by emotional or behavioural difficulties ( $p = 0.81$ ), anxiety ( $p = 0.30$ ) or depression ( $p = 0.56$ ). The potential influence of these missing responses was accommodated by FIML which uses using all available information to estimate model parameters.

#### 3.3. SURPS subscale scores for the Australian adolescent sample

SURPS scores for the four personality subscales (H, AS, IMP and SS) are shown in Table 1. There were no statistically significant differences between males and females for any of the subscales. Table 1 shows the descriptives of the SURPS subscales, overall and by gender, and a comparison to the UK sample.

##### 3.3.1. Comparison of SURPS subscale scores between the Australian and UK samples

Although the total mean scores for the H and IMP scales were slightly higher for the UK adolescents, and the total mean score for the AS scale was slightly higher for Australia, these differences were not statistically significant (Table 1).

#### 3.4. Concurrent and prospective validity for the Australian adolescent sample

The concurrent validity of the SURPS subscales in relation to substance use and other emotional and behavioural problems is shown in Table 2. H was associated with an earlier age of drinking onset, drinking rates, binge drinking rates and tobacco use. H was not associated with drinking problems or illicit drug use. H was associated with higher depression scores, emotional problems, conduct problems and hyperactivity, and lower scores for pro-social behaviour. AS was associated with an older age of drinking onset and less binge drinking. AS was not associated with drinking problems, tobacco use or illicit drug use. AS was related to higher depression scores, higher emotional problems and lower conduct problems. IMP was related to more problematic drinking (with earlier age of drinking onset and a positive association with all other alcohol use variables)

and greater tobacco rates. IMP was not associated with illicit drug use, depression or emotional problem, but was associated with higher scores for conduct and hyperactivity problems, and lower scores for pro-social behaviour. SS was associated with an earlier age of drinking onset, but no other alcohol or drug use variables. SS was not associated with depression, conduct problems or pro-social behaviour, but was associated with lower emotional problems and greater hyperactivity.

Table 3 shows prospective associations between the SURPS subscales at baseline and substance use and other emotional and behavioural problems at the 24 month follow-up. H remained significantly and positively associated with drinking problems but no other substance use variables. H also remained associated with higher depression scores, emotional problems and hyperactivity, but was no longer associated with conduct problems or pro-social behaviour. AS was not associated with any of the substance use variables, nor depression, emotional problems or conduct problems. AS was associated with less hyperactivity and lower scores for pro-social behaviour. IMP was associated with drinking problems, tobacco use, cannabis use and other drug use, as well conduct problems, hyperactivity and lower scores for pro-social behaviour. SS was associated with all of the substance use outcomes and hyperactivity.

##### 3.4.1. Comparison of findings between the Australian and UK samples

Overall, the substance use and other emotional and behavioural problems appear to be greater in the UK sample than the Australian sample aside from drinking problems which was higher in the Australian sample (Tables 2 and 3).

##### 3.4.2. Comparison of concurrent validity between the Australian and UK samples

As shown in Table 2, the Australian and UK samples had similar results for the H scale for emotional and behavioural problems, but some different findings for substance use. Specifically H was related to earlier age of drinking onset, drinking rates and binge drinking in Australia only, whereas H was related to drinking problems and illicit drug use in the UK only. In regards to the AS scale, the samples had some similar associations for substance use (including an older age of drinking onset and no associations with drinking problems, tobacco use, or other drug use), as well as similar results for depression and emotional problems. Only the Australian sample showed AS was related to less binge drinking and less conduct problems and only the UK sample showed AS was associated with less drinking, less cannabis use and higher scores on prosocial behaviour. Both samples showed a similar substance use pattern for the IMP scale, except there were no significant associations for cannabis or other drug use in the Australian sample. There were also similar results for emotional and behavioural problems, except there was only a significant association between IMP and higher depression scores in the UK sample. Both samples showed a similar substance use pattern for the SS scale and the emotional and behavioural problems except SS was related to less emotional problems and greater hyperactivity in Australia only.

##### 3.4.3. Comparison of prospective validity between the Australian and UK samples

As shown in Table 3, the H was prospectively related to drinking problems and emotional problems in Australia only and was related to

**Table 1**  
SURPS subscale scores by gender at baseline ( $N = 527$ , 67% female; mean age 13.4 years): Australian and UK samples.

SURPS subscales	Australian sample			UK sample		
	Female mean (SD)	Male mean (SD)	Total mean (SD)	Female mean (SD)	Male mean (SD)	Total mean (SD)
Hopelessness	12.04 (3.44)	11.49 (3.00)	11.85 (3.31)	12.98 (3.32)	12.62 (3.65)	12.77 (3.51)
Anxiety sensitivity	12.14 (2.41)	11.47 (2.46)	11.93 (2.44)	11.76 (2.64)	10.84 (2.62)	11.23 (2.67)
Impulsivity	10.83 (2.60)	11.81 (2.71)	11.15 (2.67)	12.46 (2.82)	12.28 (2.92)	12.35 (2.88)
Sensation seeking-R	13.46 (2.86)	14.78 (2.66)	13.90 (2.86)	13.22 (3.06)	14.37 (2.79)	13.88 (2.96)

SURPS: Substance Use Risk Profile Scale; R: revised; SD: standard deviation; Sensation Seeking-Revised = Items 3, 6, 9, 12, 19.  
UK data taken from Castellanos-Ryan et al. (Castellanos-Ryan et al., 2013a).

**Table 2**

Concurrent prediction of substance use, emotional and behavioural problems by SURPS subscales at baseline after accounting for effects of age, gender and ethnicity (N = 527).

	Rates (%) / [mean, SD]	Model change		SURPS subscale scores (odds ratio/[beta])			
		Nagelkerke R <sup>2</sup> / [R square]	Hopelessness	Anxiety sensitivity	Impulsivity	Sensation seeking-R	
Age of drinking onset <sup>±</sup>							
Australian sample	[12.6, 1.34 <sup>±</sup> ]	[.09***]	[−.12*]	[.10*]	[−.13***]	[−.18***]	
UK sample	[11.5, 1.10]	[0.06***]	[0.00]	[0.11***]	[−0.21***]	[−0.08**]	
Drinking rates							
Australian sample <sup>a</sup>	14%	0.14***	1.57**	0.79	1.72***	1.33 <sup>±</sup>	
UK sample <sup>b</sup>	38%	0.05***	1.07	0.69**	2.13***	1.09	
Binge-drinking rates							
Australian sample	3%	0.24***	1.27**	0.69*	2.26***	0.96	
UK sample	17%	0.07***	1.56	0.97	2.43***	1.22	
Any drinking problems							
Australian sample	42%	0.09***	0.98	1.02	1.40**	1.13	
UK sample	27%	0.09***	1.56***	0.93	2.57***	0.98	
Tobacco use rates							
Australian sample	6%	.16***	1.76**	0.75	1.80**	1.34	
UK sample	9%	0.11***	1.70*	0.57	3.62***	1.14	
Cannabis use rates							
Australian sample	6%	0.01	1.05	0.88	1.25	0.93	
UK sample	7%	0.11***	1.80**	0.50**	3.73***	0.88	
Other drug use rates							
Australian sample	2%	0.10*	1.57	0.67	1.77 <sup>±</sup>	0.99	
UK sample	3%	0.12***	2.99**	0.51	4.06***	0.89	
BSI depression total							
Australian sample	[3.73, 4.21]	[0.47***]	[0.65***]	[0.09**]	[0.04]	[0.06]	
UK sample	[5.13, 5.18]	[0.22***]	[0.37***]	[0.22***]	[0.09**]	[0.06]	
SDQ Emotional problems							
Australian sample	[2.81, 2.17]	[0.41***]	[0.50***]	[0.25***]	[0.07]	[−0.13***]	
UK sample	[3.00, 2.19]	[0.23***]	[0.26***]	[0.38***]	[0.02]	[0.05]	
SDQ Conduct problems							
Australian sample	[1.65, 1.49]	[0.36***]	[0.21***]	[−0.08*]	[0.52***]	[−0.02]	
UK sample	[2.99, 1.81]	[0.33***]	[0.17***]	[−0.07]	[0.53***]	[0.05]	
SDQ Hyperactivity problems							
Australian sample	[3.37, 2.08]	[0.44***]	[0.32***]	[−0.04]	[0.46***]	[0.13**]	
UK sample	[4.47, 2.01]	[0.22***]	[0.19***]	[0.00]	[0.41***]	[0.00]	
SDQ Pro-social behaviour							
Australian sample	[8.17, 1.48]	[0.14***]	[−0.13**]	[0.02]	[−0.32***]	[0.07]	
UK sample	[6.32, 2.01]	[0.10***]	[−0.24***]	[0.21***]	[−0.18***]	[0.06]	

Significance level: \*\*\*p &lt; .001, \*\*p &lt; .01, \*p &lt; .05.

SDQ: Strengths and Difficulties Questionnaire; SD: standard deviations; R: revised.

Coefficients show unique effects of personality traits, as all four personality variables are entered simultaneously into each model; Age, gender and country of birth were included as covariates: Female gender was associated with lower drinking harms (OR = 0.60, p < .001), higher anxiety (β = .12, p < .01), emotional problems (β = .17, p < .001) and pro-sociality (β = .17, p < .001), and lower conduct problems (β = −.15, p < .01); adolescents born in Australia had lower drinking rates (OR = 0.51, p < .05) and lower emotional problems (β = −.11, p < .01) compared to those born outside of Australia; higher age was significantly associated with having tried any alcohol (OR = 1.87, p < .001), drinking rates (OR = 2.57, p < .05) and cannabis use (OR = 2.65, p < .05).

UK data taken from Castellanos-Ryan et al. (Castellanos-Ryan et al., 2013a).

<sup>±</sup> This mean represent the mean age of onset of drinking for those who reported ever having had a full drink at baseline (T1).<sup>a</sup> Australian sample – drinking rates was assessed by asking students to indicate whether they consumed a standard alcoholic drink in the past 6 months.<sup>b</sup> UK sample – drinking rates was assessed by asking students whether they had consumed any alcoholic beverage in the past 6 months.

illicit drug use and conduct problems in the UK only. The prospective associations between AS and substance use were similar between the two samples (no significant associations), but an association with emotional problems was only found in the UK and an association with lower hyperactivity and pro-social behaviour was only found in Australia. Both samples showed a prospective relationship between IMP, drinking problems, cannabis use, conduct and hyperactivity. Only the Australian sample showed a relationship between IMP, tobacco use, other drug use and less pro-social behaviour. SS was prospectively related to illicit drug use in both sample but only to binge drinking, drinking problems, tobacco use, and depression in the Australian sample, and only to prosocial behaviour in the UK sample.

#### 4. Discussion

This study examined the validity of the SURPS, a measure of personality risk factors for substance use, in predicting substance use, emotional and behavioural problems in a longitudinal sample of Australian adolescents. Results replicated previous research showing that the SURPS is effective in making meaningful predictions of substance use and other emotional and behavioural problems among adolescents

(Castellanos-Ryan et al., 2013a; Krank et al., 2011). It compared these findings to a UK adolescent sample. Overall, the findings were similar between the two samples, indicating that the scale has good utility among Australian adolescents.

Specifically, the current findings were consistent with all the personality-specific hypotheses either concurrently or prospectively, except that H was not found to be associated with illicit drug use in the Australian sample. This finding differs to that in the UK and may have resulted from the lower prevalence of cannabis and other drug reported in the Australian sample, for example, at the 24 month follow-up 20% of the UK sample reported using cannabis in the past month versus 85 of the Australian sample. Alternatively, it may be that H is a greater risk factor in predicting illicit drug use in the UK than Australia, while H seems to be a greater risk factor for predicting emotional problems and depression scores in Australia than in the UK. A longer follow-up of the sample across the adolescent years as exposure to illicit substances increases would allow us to better understand these relationships.

Interestingly, the sample in the UK appeared to be “higher risk” than the Australian sample, with scores on all substance use and emotional and behavioural problems outcomes greater in the UK than Australia

**Table 3**  
Prospective prediction of substance use, emotional and behavioural problems at 24 months follow up by SURPS subscales at baseline after accounting for effects of age, gender, country of birth and baseline scores (N = 527). UK data taken from (Castellanos-Ryan et al., 2013a).

	Rates (%)/[mean, SD]	Model change		SURPS subscale scores (odds ratio/[beta])			
		Nagelkerke R <sup>2</sup> /[R square]		Hopelessness	Anxiety sensitivity	Impulsivity	Sensation seeking-R <sup>2</sup>
Drinking Q × F							
Australian sample	[1.63, 4.48]	[.02]		[−.03]	[−.03]	[.07]	[.21***]
UK sample <sup>a</sup>	N/A	N/A		N/A	N/A	N/A	N/A
Binge-drinking rates							
Australian sample	20%	0.07***		1.08	1.02	1.27	1.53**
UK sample	34%	0.02***		1.01	0.71	1.96***	1.00
Any drinking problems							
Australian sample	49%	0.07**		1.25*	1.05	1.31*	1.28*
UK sample	41%	0.02**		1.40	1.00	1.44**	1.13
Tobacco use rates							
Australian sample	15%	0.06***		1.01	1.14	1.64**	1.55**
UK sample <sup>b</sup>	N/A	N/A		N/A	N/A	N/A	N/A
Cannabis use rates							
Australian sample	8%	0.07***		1.11	0.73	1.45*	1.47*
UK sample	20%	0.08***		1.60**	0.69	2.29***	1.66***
Other drug use rates							
Australian sample	4%	0.21***		0.81	0.90	1.73*	2.75*
UK sample	5%	0.06***		0.06***	0.65	1.92	2.23**
BSI depression total							
Australian sample	[4.84, 5.13]	[0.04***]		[0.26**]	[−0.05]	[−0.06]	[0.12**]
UK sample	[4.84, 5.46]	[0.02***]		[0.10**]	[0.02]	[0.04]	[0.06]
SDQ Emotional problems							
Australian sample	[3.34, 2.24]	[0.02***]		[0.18***]	[−0.04]	[−0.04]	[0.03]
UK sample	[2.45, 2.12]	[0.02***]		[0.06]	[0.10**]	[0.06]	[0.00]
SDQ Conduct problems							
Australian sample	[1.94, 1.58]	[0.03**]		[0.04]	[−0.01]	[0.19***]	[0.05]
UK sample	[2.79, 1.70]	[0.02**]		[0.09**]	[−0.01]	[0.08**]	[0.06]
SDQ Hyperactivity problems							
Australian sample	[3.97, 2.11]	[0.04***]		[0.11**]	[−0.14***]	[0.17***]	[0.09*]
UK sample	[4.45, 2.04]	[0.04***]		[0.10**]	[−0.05]	[0.16***]	[0.08**]
SDQ Pro-social behaviour							
Australian sample	[7.65, 1.70]	[0.03**]		[−0.05]	[−0.09*]	[−0.09*]	[−0.03]
UK sample	[5.99, 2.43]	[0.01**]		[−0.03]	[0.04]	[−0.02]	[0.10**]

Significance level: \*\*\*p < .001, \*\*p < .01, \*p < .05.

Q × F: quantity by frequency; SDQ: Strengths and Difficulties Questionnaire; SD: standard deviations; R: revised.

Coefficients show unique effects of personality traits, as all four personality traits are entered simultaneously into each model.

Age, gender, country of birth and baseline scores were included as covariates: Female gender was associated with lower other drug use rates (OR = 0.16, p < .001), higher depression (β = .15, p < .001), anxiety (β = .18, p < .001), emotional problems (β = .12, p < .01) and pro-sociality (β = .16, p < .001); country of birth and age were not significantly associated with any variable. Finally all baseline measures were significantly associated with outcome measures 24 months later, except for drinking quantity by frequency and other drug use, with betas ranging from .36 (for pro-sociality) to .67 (for hyperactivity problems) and odds ratios ranging from 2.24 (for drinking problems) to 54.85 (for tobacco use).

UK data taken from Castellanos-Ryan et al. (Castellanos-Ryan et al., 2013a).

<sup>a</sup> Drinking Q × F not included in the UK study.

<sup>b</sup> UK study included tobacco use quantity not rates.

except for drinking problems. This may have resulted from the UK sample being slightly older at baseline with a mean age of 13.7 years versus 13.4 years in Australia, or from the different demographic range of schools included in each study. In addition, there were variations in some of the outcome measures between the countries that may be contributing to these differences. For example, “drinking rates” was assessed more conservatively in Australia where participants were asked to report whether they had consumed a full standard drink of alcohol versus in the UK where participants were asked if they had consumed any alcohol (including a sip). Caution should therefore be taken when making comparisons between the samples.

The results of this study should be considered in light of several limitations. First, this study is based on a sample of Australian adolescents that may not be entirely representative of the general population. Although rates of alcohol use in the present study were similar to those reported in other large surveys of Australian school students (White & Bariola, 2012), we are unable to draw such comparisons on other outcomes of interest such as behavioural and emotional symptoms. A second potential limitation is that this study relies on self-report data from adolescents. However, self-reports of substance use and risk behaviours have been shown to be a reliable and approach (Clark & Winters, 2002), especially when assurances of confidentiality

are provided and students self-administer the survey online (Brener, Billy, & Grady, 2003), both of which occurred in the present study. The above limitations notwithstanding, the present study has several important strengths. These include the diversity of the sample, which included students from a range of public and private schools, as well as being the first investigation of the validity of the SURPS in Australian adolescents thereby adding to the international literature of the scales validity and reliability.

Given the high prevalence of substance use and related harms among Australian adolescents, it is crucial to focus on improving prevention strategies. Personality-targeted selective prevention programs have been found to be highly effective in delaying the uptake and reducing the harmful use of alcohol and other drugs in Canada and the UK (Conrod et al., 2013; Conrod et al., 2010; Conrod et al., 2008c). An integral part of these programs is to effectively screen and identify individuals at increased risk of developing substance use. The current study was the first to examine and validate the SURPS as an effective personality screening instrument to predict substance use, emotional and behavioural problems, among Australian adolescents. The next important step is to utilise this useful measure to screen high-risk individuals and deliver evidence-based selective prevention to reduce the significant burden of disease and social costs associated with substance use in Australia.

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### Contributors

NN, PC, TS and MT designed the study and wrote the protocol. KC, EB, EK, NN and LS collected data for the study and NCR conducted the statistical analysis. NN wrote the first draft of the manuscript and all authors contributed to and approved the final version of the manuscript.

### Conflict of interest

All authors declare that they have no conflicts of interest.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.addbeh.2015.09.015>.

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