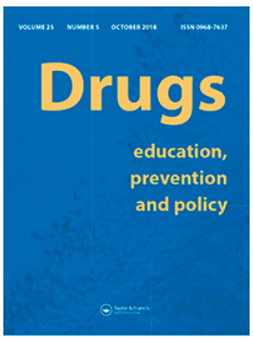

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Working at heights: patterns and predictors of illicit drug use in construction workers

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ABSTRACT

Employee drug use poses a serious risk to health and safety in male-dominated industries yet patterns and determinants of drug use in construction are not well understood. This study assessed prevalence rates and predictors of Australian construction workers' use of cannabis, cocaine and meth/amphetamine. Workers ($N = 511$) completed a survey that assessed use of the three drug types; alcohol use; general health and mental health; job stress and the workplace cultural norms for each drug. Hierarchical binary logistic regressions examined predictors. Use of each drug over the past 12 months was two–five times higher than the national averages. Higher alcohol consumption was a consistent predictor across drug types and younger age and poorer general health were predictive of cannabis and cocaine use. Higher psychological distress was associated only with cannabis use. Workplace availability, descriptive and injunctive norms were significant predictors of cocaine use. The findings highlight concerning patterns of drug use in construction, particularly high levels of cocaine, with serious implications. The influence of cocaine workplace availability and norms highlight the importance of the workplace culture. Multi-component approaches involving culture change and individual-level responses that target vulnerable workers are required to minimize risk from drug-related harm.

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Introduction

Psychoactive drug use is a leading risk factor for injury and disease and places a substantial cost on health and social systems (Lim et al., 2012; Room et al., 2005; World Health Organization (WHO), 2018). Alcohol and other drug (AOD)-related health and social harms also extend to the workplace, where worker substance use can impact workplace safety, worker well-being and the general public (Frone, 2019; Pidd et al., 2019). Further adverse consequences of worker substance use include increased rates of absenteeism (Roche et al., 2016; Schou & Moan, 2016; Van Hasselt et al., 2015) and less quantifiable negative effects such as presenteeism and reduced productivity (Frone, 2019; Pidd et al., 2018).

The effects of psychoactive drug use on worker performance and cognition can increase the risk of workplace accidents and injury in a number of ways. Acute effects of cannabis, the most commonly used illicit drug globally (United Nations Office on Drugs and Crime, 2016), include drowsiness, distorted perception, and impaired motor function (Ashton, 1999; Ramaekers et al., 2004, 2006). The effects of stimulant drugs, including amphetamine-type substances and cocaine, include increased arousal and confidence, with dose-dependent negative impacts on psychomotor performance, reasoning and cognition (Logan, 2002; Spronk et al., 2013). The health effects associated with the chronic use of illicit drugs may also impact workplace safety via increased risk of psychotic episodes, insomnia, mental illness and mood disturbances (Pidd et al., 2019).

Internationally, the construction industry has been identified as high risk for workplace drug use and related harms (Bush & Lipari, 2014; Corral et al., 2012; Pidd et al., 2019). Construction is one of the largest industries worldwide, employing over 7 million workers in the United States (Associated General Contractors of America, 2020) and contributing around 9% of Australia's Gross Domestic Product (Australia Industry and Skills Committee, 2020). Construction work is also recognized globally as a demanding and dangerous profession, with workers frequently exposed to high occupational risk and hazardous working conditions (Lingard, 2019). Secondary analysis of national data indicates that workers employed in construction have significantly higher rates of illicit drug use than workers in other industries and are more likely to come to work under the influence of drugs than other occupational groups (Pidd et al., 2011). Similar patterns are reported internationally (Gavioli et al., 2014; Herschet al., 2002; Mushi & Manege, 2018). While field studies in this area are scarce, a 2006 survey of Australian construction workers reported that 31% had used cannabis and 8% had used amphetamines in the past year (Banwell et al., 2006). Both of these proportions were approximately double that of national estimates. In the same study, 2% reported cocaine use over the previous 12 months, which was

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comparable to the 2001 national estimate of 1.6% in the general population.

Despite clear evidence that construction worker drug use is of concern, predictors of use in Australia or elsewhere are not well understood, and there is a paucity of recent data to inform tailored policy and prevention options. However, several key factors are likely to be associated with drug use in this worker group. Illicit drug use is typically more prevalent in younger age groups, with previous studies indicating that young construction workers have an increased vulnerability to drug-related harm (Pidd et al., 2017). As well as posing physical risks to health, construction is also a high-stress occupation typically characterized by poor working conditions and high rates of psychological distress (Milner et al., 2017); all of which are associated with drug use among workgroups (Pidd & Roche, 2008). Furthermore, the consumption of alcohol with other drugs is the most common pattern of polydrug use (Earleywine & Newcomb, 1997), with previous research reporting elevated levels of drinking in users of illicit drugs (Klimas et al., 2018). Data relating to alcohol use in construction workers consistently show elevated levels of risky drinking in comparison to workers in other industries and the general population (Du Plessis et al., 2014; Hersch, et al., 2002; Pidd, et al., 2011, 2017), suggesting that construction workers may be at risk of specific harms from a combination of drug and alcohol use.

In addition to individual-level characteristics, characteristics of the workplace environment and culture can be strongly conducive to, or discourage, worker drug and alcohol use (Pidd & Roche, 2008). Previous work describes this influence as the workplace substance use climate, defined broadly as employees' perceptions of the extent to which their work environment is supportive of use at work (Frone, 2009, 2012) via three conceptual domains. The first domain is availability, or the perceived ease of access to the drug at work; the second domain is descriptive norms, defined as the extent to which workers are aware of use at work by coworkers, and the third domain is injunctive norms, or the perceived extent to which workmates would approve or disapprove of use at work. A permissive workplace substance use climate, where the substance is easily accessible and workers are exposed to drug-related norms has been linked to employee substance use as well as work strain and low morale (Frone, 2009, 2012; Macdonald et al., 1999). These concepts are likely to be of particular relevance to construction, where reports suggest that drugs are readily available on worksites and traditional masculine group norms are strong (Ajslev et al., 2017; George & Loosemore, 2019; Iacuone, 2005; Ibáñez & Narocki, 2011). To date, the relationship between workplace substance use climate and drug use in the construction industry has not been investigated.

In light of the above, it is critical to identify predictors of drug use in this high-risk and under-researched industry group, to redress the dearth of current literature and inform appropriate prevention and harm minimization responses. The aim of this study was to assess determinants of the use of three main drug types (cannabis, cocaine and meth/amphetamine) in male construction workers, in terms of individual-level predictors and workplace substance use climate variables. Based on previous work, it was hypothesized that workplace exposure to substance use climate in the form of drug availability and related workplace norms would predict drug use in male construction workers, over and above the effects of age, general and mental health and alcohol use.

Method

Recruitment of participants and procedure

A convenience sample of construction workers in NSW were obtained through collaboration with the NSW Building Trades Group (BTG). Subjects were recruited as part of a BTG professional development session. Workers were approached by researchers onsite prior to undertaking drug and alcohol impairment training at their workplace and asked to take part in an anonymous survey study. Participants were assured that participation was entirely voluntary; that the decision to participate would not impact their work in any way, and full informed consent was obtained. Confidentiality and anonymity were assured, and workers were free to refuse participation or withdraw at any time. Employers and site managers had no part in the recruitment process or data collection and had no knowledge of participation rates or responses. The survey was developed and administered by the National Centre for Education and Training on Addiction (NCETA). The pen- and paper-based questionnaire was administered to all participants and took approximately 15 minutes to complete. Full ethical approval (project number #7932) was obtained from Flinders University Social and Behavioural Research Committee.

Measures

Drug use over the past 12 months was measured by three items: How often have you used: (1) cannabis, (2) cocaine, and (3) meth/amphetamine in the past 12 months? Response options (never/every day/once a week or more/once a month/less often) for each drug were dichotomized: never was coded as 0 (did not use in the past 12 months), and all other options were coded as 1 (used in the past 12 months).

The 3-item Alcohol Use Disorder Identification Test of Consumption (AUDIT-C) (Bradley et al., 2007) assessed the frequency of having an alcoholic drink; the number of standard drinks consumed on a typical day, and the frequency of drinking six or more drinks on a single occasion. The third question of the AUDIT-C was modified to five or more drinks on a single occasion, to align with Australian alcohol guidelines (National Health and Medical Research Council (NHMRC), 2009). Total scores for the AUDIT-C range from 0-12, with continuous scores $\geq$ 4 indicating at-risk drinking.

Substance use climate during work hours was measured separately for each drug type (e.g. cannabis, cocaine and meth/amphetamine) via three items assessing (1) workplace substance availability, (2) workplace substance injunctive norm, and (3) workplace substance use descriptive norm, based on Frone (2009, 2012). Workplace substance availability was measured by asking respondents how easy or difficult it would be to use the drug during work hours (including lunch

and breaks). Response options were: very difficult/difficult/easy/very easy. Workplace substance injunctive norm was measured with the question: to what extent would your closest workmates approve or disapprove of using the drug at work (including lunch and breaks): strongly disapprove/disapprove/neither approve nor disapprove/approve/strongly approve. Workplace descriptive norm was assessed by the item: In the past 12 months, how often were you aware of someone at work who used the drug during work hours (including lunch and breaks): never/less than once a month/1-3 days a month/1-2 days a week/nearly every day. Measures were dichotomized according to Frone (2012). For workplace availability, very difficult/difficult response options were coded as 0 and easy/very easy responses were coded as 1. For injunctive norm, strongly disapprove/disapprove were coded as 0 and all other response options as 1; for descriptive norm, never was coded as 0 and all other response options as 1.

General health was measured by a single item scored from 1-5: In general, would you say your health is … (1) poor – (5) excellent (Ware & Sherbourne, 1992).

Psychological distress was measured by the 10-item Kessler 10 (K10) (Kessler et al., 2002). Each item (e.g. 'In the past four weeks, how often did you feel hopeless?') is scored 1 (none of the time) to 5 (all of the time) and scores were summed to provide a total score ranging from 10-50, with higher scores indicating higher psychological distress. The scale showed good reliability ($\alpha = .93$).

Job stress was assessed using the 5-item Job Stress Scale (Lambert et al., 2006 adapted from Crank et al., 1995), measured on a 5-point scale from (1) strongly disagree to (5) strongly agree (e.g. 'A lot of the time my job makes me very frustrated or angry'). Items were summed and averaged, with higher scores indicating higher job stress ($\alpha = .78$).

Statistical analysis

Descriptive analyses were conducted to explore the association between variables. Bivariate tests examined differences on predictor variables (general health, psychological distress, job stress, AUDIT-C score, workplace availability, descriptive norm and injunctive norm) between users and non-users of cannabis, cocaine, and meth/amphetamine. Hierarchical binary logistic regressions were then performed separately on each drug type with user status (no use = 0, use = 1) over the past 12 months as the outcome, controlling for age, with all variables that were significant in the bivariate analysis for each drug type used as predictors. Where applicable, the individual-level predictors of general health, psychological distress, job stress and AUDIT-C score were entered in the first step (Model 1), and workplace substance use climate variables (availability, injunctive norm and descriptive norm, each corresponding with the relevant drug type) were entered in the second step (Model 2) to determine whether cultural factors reliably enhanced predictive validity over and above the individual-level predictors. Analyses were conducted in SPSS v25.0.

Results

Of approximately 530 male respondents who were invited to participate, 511 completed the survey, demonstrating a high response rate. Of these 511 participants, $n = 500$ provided a response to frequency of cannabis use, $n = 500$ for cocaine and $n = 499$ for meth/amphetamine, representing the data available for analysis. To reduce the impact of outliers, extreme values ($n = 8$) were truncated to 3.29 standard deviations above the mean (Tabachnick & Fidell, 2013). Pearson correlations were calculated with correlation magnitude interpreted as <0.1 = trivial; 0.1 to <0.3 = small; 0.3 to $<.05$ = moderate, and $>.05$ = large (Cohen, 1992). The majority of correlations between variables were trivial to small. AUDIT-C scores showed a small correlation with meth/amphetamine use ($r = .21$); moderate correlations with cannabis and cocaine use ($rs = .32$ and .38, respectively), and a small negative correlation with general health ($r = -.24$). Small negative correlations were also shown between cocaine use and general health ($r = -.22$), and cannabis use and age ($r = -.23$). The largest correlation was between job stress and psychological distress ($r = .48$). No sources of multicollinearity or other violations of assumptions were identified.

Descriptive statistics and bivariate analyses

Table 1 shows the prevalence of use for each drug type and descriptive statistics for all variables by user status. The mean age of the sample was 35.1 ± 11.76 years, range 15–68. The majority (47%) of the sample had worked in the construction industry for over 10 years; others had worked in construction for variable periods of time: 6.9% <12 months; 13.0% 1–2 years; 19.4% 3–5 years; 13.8% 6–10 years. Twenty-one percent of the sample had used cannabis in the past 12 months; 23% had used cocaine, and 6% reported using meth/amphetamine over the past year (Table 1). Weighted estimates from national data indicate that these prevalence rates are high; in comparison, 14.5% of employed Australian men over the age of 15 reported cannabis use in the past year; 4.4% cocaine use, and 1.8% meth/amphetamine use (Australian Institute of Health and Welfare (AIHW), 2017).

On average, respondents reported good/very good general health ($m = 3.79 \pm .86$). Psychological distress mean score was 15.93 ± 6.41. Scores of 15 or under on the K10 are considered low psychological risk, with previous national estimates of Australian males reporting a mean score of 13.9 (Andrews & Slade, 2001). Thus, psychological distress was slightly higher than national estimates. Job stress was mid-range ($m = 2.43 \pm .78$) on the 5-point scale and the mean AUDIT-C score was 5.02 ± 2.97, indicating hazardous levels of drinking on average. Previous research has reported a mean population AUDIT-C score of 4.5 ± 3.0 (Wade et al., 2014).

Across the sample, workplace substance use availability varied across drug type. Thirty-five percent of respondents thought that it would be easy to use cannabis at work and 45% and 41% considered it easy to use cocaine and meth/amphetamine in the workplace, respectively. In relation to descriptive norms, 17% of respondents were aware of someone who used cannabis at work, in comparison to 11% for cocaine and 9% for meth/amphetamine. Injunctive norm

Table 1. Descriptive statistics and univariate comparisons by drug user status.

Variable	Total	Did not use in past 12 months	Used in past 12 months	*p* Value
Cannabis, % (*n*)	–	78.6 (393)	21.4 (107)	–
Cocaine, % (*n*)	–	76.8 (384)	23.2 (116)	–
Meth/amphetamine, % (*n*)	–	94.0 (469)	6.0 (30)	–
Age, *m* (sd)	35.1 (11.76)	–	–	
Cannabis	–	36.54 (12.03)	29.69 (9.08)	<.001
Cocaine	–	36.30 (12.27)	31.01 (9.00)	<.001
Meth/amphetamine	–	35.29 (11.83)	31.17 (10.44)	.063
General health, 1–5, *m* (sd)	3.79 (.86)	–	–	
Cannabis	–	3.88 (.84)	3.46 (.85)	<.001
Cocaine	–	3.89 (.82)	3.44 (.90)	<.001
Meth/amphetamine	–	3.80 (.87)	3.53 (.78)	.978
Psychological distress, 10–50, *m* (sd)	15.93 (6.41)	–	–	
Cannabis	–	15.32 (6.06)	17.94 (6.89)	<.001
Cocaine	–	15.30 (6.00)	17.76 (7.02)	<.001
Meth/amphetamine	–	15.80 (6.38)	17.28 (5.49)	.223
Job Stress, 1–5, *m* (sd)	2.43 (.78)			
Cannabis	–	2.38 (.78)	2.62 (.77)	.005
Cocaine	–	2.37 (.79)	2.62 (.70)	.002
Meth/amphetamine	–	2.42 (.79)	2.57 (.59)	.312
AUDIT-C, 0–12, *m* (sd)	5.02 (2.97)	–	–	
Cannabis	–	4.54 (2.91)	6.88 (2.40)	<.001
Cocaine	–	4.40 (2.84)	7.10 (2.38)	<.001
Meth/amphetamine	–	4.89 (2.94)	7.45 (2.28)	<.001
Availability[a], % (*n*)	–	–	–	
Cannabis	34.7 (171)	33.6 (130)	39.0 (41)	.298
Cocaine	44.6 (219)	38.6 (145)	64.9 (74)	<.001
Meth/amphetamine	40.5 (200)	39.2 (118)	63.3 (19)	.009
Descriptive norm[b], % (*n*)	–	–	–	
Cannabis	17.4 (86)	14.7 (57)	26.4 (28)	.005
Cocaine	10.7 (53)	5.3 (20)	27.8 (32)	<.001
Meth/amphetamine	9.4 (46)	9.1 (42)	10.3 (3)	.742*
Injunctive norm[c], % (*n*)	–	–	–	
Cannabis	12.4 (61)	9.8 (38)	22.1 (23)	.001
Cocaine	10.2 (50)	5.9 (22)	24.8 (28)	<.001
Meth/amphetamine	7.1 (35)	6.3 (29)	20.0 (6)	.014*

% selected [a]easy to use during work hours, [b]aware of someone at work using during work hours, [c]closest workmates would not disapprove of using at work, *Fisher's exact test.

prevalence showed that 12%, 10%, and 7% thought that their closest workmates would not disapprove of using cannabis, cocaine and meth/amphetamine at work, respectively.

For all drug types, bivariate comparisons showed significant differences between user and non-user for all predictor variables with the exception of workplace availability ($p = .30$) for cannabis; and general health, psychological distress, job stress and descriptive norms for meth/amphetamine use (*p*s ranging from .10 to .74). Overall, differences between non-use vs use were in the expected direction: respondents who reported drug use over the past 12 months were generally younger; had lower general health scores; higher psychological distress, higher job stress and higher AUDIT-C scores. In relation to workplace substance climate, a higher proportion of those reporting use of all drug types perceived ease of availability and norms around workplace use (Table 1).

Regression analyses

Hierarchical binary logistic regression models were conducted separately for (1) cannabis, (2) cocaine, and (3) meth/amphetamine.

Cannabis

The first set of predictors entered in Model 1 reliably distinguished workers who had used cannabis in the past 12 months from those who had not (χ^2 (5) = 97.68, $p < .001$). The addition of descriptive and injunctive norms in Model 2 did not improve the model fit (block χ^2 (2) = 2.20, $p = .333$), indicating that workplace norms did not play in a role in cannabis user status (Table 2).

Significant predictors of cannabis use were age, general health, psychological distress and alcohol use. Specifically, a one year increase in age significantly reduced the likelihood of cannabis use by a factor of 0.93 (95% CI 0.91–0.96), and a one point increase in general health score lowered the probability of cannabis use by a factor of 0.60 (95% CI 0.43–0.82). In contrast, a one point increase in psychological distress score raised the probability of cannabis use over the past year by a factor of 1.05 (95% CI 1.00–1.10), and an increase of one on the AUDIT-C measure raised the probability by a factor of 1.29 (95% CI 1.17–1.42) (Table 2).

Cocaine

For cocaine, Model 1 was significant (χ^2 (5) = 107.05, $p < .001$). Following inclusion of the workplace availability, descriptive norms and injunctive norms in Model 2, the block chi-square statistic was significant (χ^2 (3) = 33.41, $p < .001$) and pseudo R^2 statistics increased by approximately 8% (Model 2 Nagerlkerke $R^2 = .40$), indicating reliably enhanced prediction (Table 3).

Significant predictors of cocaine use were age (a one year increase in age lowered the likelihood of cocaine use by a

Table 2. Coefficients for hierarchical models predicting cannabis use in the past 12 months (0 = did not use, 1 = used).

	Cannabis			
		95% CI for Odds Ratio (OR)		
	B	Lower	OR	Upper
Model 1				
Constant	.68	–	1.97	–
Age	−.07***	.91	.93	.96
General health	−.53**	.43	.59	.81
Psychological distress	.05*	1.00	1.05	1.10
Job stress	−.02	.67	0.98	1.43
AUDIT-C score	.27***	1.18	1.30	1.44
	R^2 = .19 (Cox & Snell), .30 (Nagerlkerke)			
	−2LL = 379.01, % correct = 80.2			
	Model χ^2 (5) = 97.68, $p < .001$			
Model 2				
Constant	.70	–	2.01	–
Age	−.07***	.91	.93	.96
General health	−.52**	.43	.60	.82
Psychological distress	.05*	1.00	1.05	1.10
Job stress	−.05	.65	.95	1.39
AUDIT-C score	.26***	1.17	1.29	1.42
Availability[a]	–	–	–	–
Descriptive norm[b]	.33	.73	1.40	2.65
Injunctive norm[c]	.30	.67	1.35	2.74
	R^2 = .20 (Cox & Snell), .30 (Nagerlkerke)			
	−2LL = 376.81, % correct = 80.4			
	Model χ^2 (7) = 99.88, $p < .001$			
	Block χ^2 (2) = 2.20, $p = .333$			

Reference [a]difficult to use during work hours = 0, [b]never been aware of someone at work using during work hours = 0, [c]closest workmates would disapprove of using at work = 0; availability was not significant in bivariate analysis and not included in models; *$p < .05$, **$p < .01$, ***$p < .001$.

Table 3. Coefficients for hierarchical models predicting cocaine use in the past 12 months (0 = did not use, 1 = used).

	Cocaine			
		95% CI for Odds Ratio (OR)		
	B	Lower	OR	Upper
Model 1				
Constant	−.69	–	.50	–
Age	−.05***	.93	.96	.98
General health	−.49**	.45	.61	.83
Psychological distress	.05*	1.00	1.05	1.10
Job stress	.06	.73	1.06	1.53
AUDIT-C score	.33***	1.26	1.40	1.54
	R^2 = .21 (Cox & Snell), .32 (Nagerlkerke)			
	−2LL = 391.78, % correct = 80.0			
	Model χ^2 (5) = 107.05, p < .001			
Model 2				
Constant	−.57	–	.57	–
Age	−.06***	.92	.95	.97
General health	−.49**	.44	.61	.85
Psychological distress	.04	.99	1.04	1.09
Job stress	.06	.72	1.06	1.56
AUDIT-C score	.30***	1.22	1.35	1.49
Availability[a]	.58*	1.03	1.78	3.07
Descriptive norm[b]	1.42**	1.85	4.13	9.24
Injunctive norm[c]	.95*	1.10	2.58	6.08
	R^2 = .27 (Cox & Snell), .40 (Nagerlkerke)			
	−2LL = 358.36, % correct = 83.0			
	Model χ^2 (8) = 140.46, $p < .001$			
	Block χ^2 (3) = 33.41, $p < .001$			

Reference [a]difficult to use during work hours = 0, [b]never been aware of someone at work using during work hours = 0, [c]closest workmates would disapprove of using at work = 0; *$p < .05$, **$p < .01$, ***$p < .001$.

factor of 0.95, 95% CI 0.92–0.97); general health (a one point increase in general health score reduced likelihood by a factor of 0.61, 95% CI 0.44–0.85); alcohol use (a one point increase in AUDIT-C score raised the odds of cocaine use by a factor of 1.35, 95% CI 1.22–1.49), and all three workplace climate variables. The perception that it would be easy to use cocaine at work (availability) was associated with 1.78 (95% CI 1.03–3.07) times greater odds of cocaine use over the past 12 months. Being aware of someone who used cocaine at work (descriptive norm) was associated with over 4 times greater odds (95% CI 1.85–9.24), and the perception that closest workmates would not disapprove of cocaine use at work (injunctive norm) was associated with 2.58 (95% CI 1.10–6.08) times greater odds (Table 3).

Meth/amphetamine

For meth/amphetamine, Model 1 was significant (χ^2 (2) = 24.24, $p < .001$), with only alcohol predicting use. The inclusion of workplace availability and injunctive norms to Model 2 demonstrated a weakly significant block change (χ^2 (2) = 7.09, $p = .029$); however, individual predictors were not statistically significant and improvements to the model (e.g., pseudo R^2 statistics) were negligible. In Model 2, alcohol use was the only significant predictor of having used meth/amphetamine over the past 12 months, with each point increase in AUDIT-C score increasing the likelihood of using meth/amphetamine by a factor of 1.34 (95% CI 1.14–1.57) (Table 4).

Discussion

Illicit drug use plays a salient role in workforce fatalities and traumatic injuries (McNeilly et al., 2010; Pidd et al., 2019). The associated risks to impairment and health and safety are of particular concern to the construction industry in Australia and internationally (Bush & Lipari, 2014; Corral et al., 2012; Du Plessis et al., 2014; Gavioli et al., 2014; Hersch, et al., 2002; Pidd, et al., 2011, 2017). This study advances the literature on drug use in construction workers in a number of important respects. The first key finding relates to the current prevalence of different drug use types in the sample, which supports previous work suggesting that drug use in this cohort is considerably higher than national averages. In line with previous reports (Banwell et al., 2006; Biggs & Williamson, 2012; Pidd, et al., 2017), cannabis use over the past 12 months (21%) was approximately two-thirds higher than national estimates, and at 6% meth/amphetamine use was approximately three times higher than the national estimate in male workers (Australian Institute of Health and Welfare (AIHW), 2017).

An important and novel finding was the high prevalence of cocaine use (23% over the past 12 months), which is five times higher than the national average among employed men, and in contrast to previous 2006 data on Australian construction workers that showed cocaine use to be low at 2% (AIHW, 2017; Banwell et al., 2006). These data draw attention to the changing patterns of drug use in the industry and have implications for health and workplace safety in an already vulnerable workgroup. In relation to the local Australian context, there is recent evidence from waste-water analyses that cocaine use is increasing in both capital city

Table 4. Coefficients for hierarchical models predicting meth/amphetamine use in the past 12 months (0 = did not use, 1 = used).

	Meth/amphetamine			
		95% CI for Odds Ratio (OR)		
	B	Lower	OR	Upper
Model 1				
Constant	−3.99	–	.08	–
Age	−.03	.94	.98	1.01
General health	–	–	–	–
Psychological distress	–	–	–	–
Job stress	–	–	–	–
AUDIT-C score	.34***	1.20	1.40	1.64
	R^2 = .05 (Cox & Snell), .14 (Nagerlkerke)			
	−2LL = 193.24, % correct = 93.8			
	Model χ^2 (2) = 24.24, $p < .001$			
Model 2				
Constant	−3.96	–	.02	–
Age	−.03	.93	.97	1.01
General health	–	–	–	–
Psychological distress	–	–	–	–
Job stress	–	–	–	–
AUDIT-C score	.29***	1.14	1.34	1.57
Availability[a]	.78	0.92	2.17	5.11
Descriptive norm[b]	–	–	–	–
Injunctive norm[c]	.87	0.80	2.40	7.24
	R^2 = .07 (Cox & Snell), .17 (Nagerlkerke)			
	−2LL = 186.15, % correct = 94.0			
	Model χ^2 (4) = 31.32, $p < .001$			
	Block χ^2 (2) = 7.09, $p = .029$			

Note: Reference [a]difficult to use during work hours = 0, [b]never been aware of someone at work using during work hours = 0, [c]closest workmates would disapprove of using at work = 0; general health, psychological distress, job stress and descriptive norms were not significant in bivariate analysis and not included in models; ***$p < .001$.

and regional sites (Australian Criminal Intelligence Commission, 2019). However, cocaine use may be particularly attractive to construction workers due to the acute pharmacological effects of heightened arousal, alertness and psychomotor speed (Ogeil et al., 2019; Spronk et al., 2013). Similarly, recent longitudinal data from the US reported that the prevalence of cocaine misuse was higher in construction workers than all other occupations (Ompad et al., 2019), suggesting an international trend.

In relation to the predictors of drug use, findings revealed interesting relationships regarding commonalities across drug types and patterns specific to individual drugs. Across drug types, and consistent with previous literature, higher rates of alcohol consumption were consistently associated with drug use (Klimas et al., 2018). Poorer general health and younger age was predictive of cannabis and cocaine use (Pidd et al., 2011, 2017). Higher psychological distress, a known contributor to the high rates of suicide among construction workers (Milner et al., 2017) was associated only with cannabis use. In contrast to previous evidence of an association between workplace stress and substance use (Bowen et al., 2014), job stress in the current study did not predict use of any drug type, suggesting that in this sample of workers, drugs were not commonly used to self-medicate symptoms of stress. However, work stressors remain important in the broader context of workplace substance use prevention and management (Frone, 2019) and should be considered when planning interventions.

Over and above the individual-level predictors, it is noteworthy that a permissive workplace substance use climate was apparent yet varied across drug types. Perceptions of workplace drug availability were high, ranging from 45% for cocaine to 35% for cannabis. On average, approximately 12% of construction workers were aware of someone using drugs at work, with the highest prevalence for cannabis (17%). Around 10% reported injunctive workplace norms around drug use. In line with the hypothesis, the predictive model for cocaine use also showed a significant improvement in variance with the addition of workplace substance use climate variables, demonstrating the influence of cocaine availability, descriptive and injunctive norms for this drug type. However, this was not the case for cannabis or meth/amphetamine. One potential explanation for this pattern of findings is that high cocaine use in Australian construction workers appears to be relatively novel; as mentioned above, 2006 data reported levels of use that were comparable to national averages of the time (Banwell et al., 2006). Therefore, workplace drug availability, co-worker use and co-worker approval may play a particularly important role when novel drug use first emerges. Nonetheless, these patterns demonstrate the influence of workplace culture and social context on the high level of cocaine use in construction workers and offer practical direction for workplace prevention and intervention strategies.

Implications

Variations in the prevalence and predictors of drug types warrant attention. The most commonly used drug in this sample was cocaine, which has received relatively little attention, being largely overshadowed by public concern and current policy focus on crystal methamphetamine (ice). Shift work and the physically demanding nature of construction work may incentivize cocaine use to offset fatigue (Ogeil et al., 2019). Furthermore, concurrent cocaine and heavy alcohol use are associated with specific and potentially fatal cardiotoxic effects, heightened aggression and impaired motor and cognitive functioning (Pennings et al., 2002). Clearly, scope exists to increase workers' understanding of the health and safety risks associated with cocaine, both alone and in combination with alcohol.

The range of strategies that may be utilized to minimize harms include appropriate policies that are tailored to the needs of individual workplaces, including education, training and health promotion activities that promote awareness of the harms of specific drugs types in combination with alcohol, with a specific focus on young workers who are particularly vulnerable as they are socialized into new work settings (Bennett et al., 2000; Pidd et al., 2017). To address permissive workplace substance use cultures, targeted social norm, team and peer-based programs may be effective in reducing exposure to, and use of, drugs in the workplace, particularly cocaine. Other key factors associated with workplace substance use, such as low levels of supervision and lack of disciplinary action, may also require concurrent and sustained attention to engender genuine change to workplace AOD culture (Frone, 2012). As the current findings suggest that availability, co-worker use and co-worker approval may be

more closely associated with the use of emerging drug types such as cocaine, it is also important that interventions and awareness programs are able to quickly respond to trends and changes in drug use types and prevalence.

Limitations

A number of limitations should be noted. Previous reports suggest that self-reported drug and alcohol behaviors and attitudes are likely to be underestimated (Greenfield & Kerr, 2008). Given that the study employed a self-report survey, the potential for social desirability responses cannot be overruled. A further potential source of bias was that the study was conducted in the workplace, which could impact responses as well as introduce pressure to participate. However, the study was conducted under strict ethical protocol to minimize the possibility of undue influence, coercion or threat to confidentiality; therefore, any risk is likely to be minimal. On a related note, it is also important to acknowledge that the pen-and-paper survey items, including those collecting demographic information, were necessarily brief in the current study. This approach was taken in order to accommodate worker time constraints in a high-demand work environment and ensure collection of essential, non-identifiable data only. Future studies would benefit from incorporating more expansive survey items and consideration of a greater range of drug types, within the constraints of industry field work. It should also be noted that the current study did not distinguish between prevalence of workforce use (e.g. off-the-job) and workplace use (e.g. before work and on-the-job use). As such, the degree of impairment arising from illicit drug use cannot be determined and remains an avenue for future research. Finally, the relatively small sample in the current study limited scope of analysis; reports of meth/amphetamine use in particular are low and replication on a larger sample size is recommended to confirm preliminary findings for this drug type.

Conclusion

This study provides unique insight into the prevalence and predictors of drug use in a sample of Australian construction workers, with broader implications for the development and implementation of workplace strategies to respond to health and safety-related harms in the workplace. Findings indicated that construction remains a high-risk industry for AOD-related harm, with high levels of cocaine. Norms and availability of cocaine in the workplace were associated with use in the past 12 months, demonstrating the important influence of social and cultural context on worker drug use. Multi-component approaches, involving culture change, education and policy responses have potential to reach a substantial proportion of vulnerable workers and minimize risk from drug-related harm.

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