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Abstract

Background and Aims. This literature review investigates the scope of information regarding self-reported substance use by professionals and students in professional programs, with a focus on anticipated and actual effects of substances.

Methods. A review of English, peer-reviewed journals and professional journals was conducted. Articles were included if they reported empirical findings of original research and specifically described an aspect of substance use (e.g. type of substance used, patterns of use, reasons for use) by professionals or students.

Results. Of the 130 articles ultimately included, 105 involved anonymous self-administered survey methodology. Self-reported data about the effects of substance use or reasons for use were reported in 35 articles. Reasons for use included positive impact on performance and experience, such as fun, pleasure, sleep, enhanced work performance, improved attention and concentration, and relaxation. Predictive associations were analysed regarding demographic factors, mental health, type of profession, and area of specialisation.

Conclusions. Little is known about the effects of substance use on the performance or experience of professionals or students in professional programs. Research is required that incorporates qualitative methodologies, elicits anticipated and actual effects of substance use, including controlled and beneficial patterns of use. Minimisation of research bias is key to future study of the effects of substance use by professionals or students in professional programs.

KEYWORDS Substance use; professionals; students; substance effects; professional socialisation; reasons for use

Background and Aims

Drugs are psychoactive substances that alter brain function, affecting consciousness, mood, and perceptions. They encompass licit substances (e.g., caffeine, alcohol, over-the-counter medication), prescribed pharmaceutical medication (e.g., oxycodone, benzodiazepines), illicit substances (e.g., marijuana, cocaine, MDMA), and traditional healing plants (e.g., peyote, ayahuasca). To understand drug use comprehensively, researchers may examine these substances collectively. This perspective can be contentious, since legal, medical, and public discourses tend to reify conceptualisations of only certain drugs as acceptable and/or healthy. Such conceptualisations shift over time: alcohol was illegal in the United States during Prohibition, cocaine was available for over-the-counter consumption (Gootenberg, 2004), and marijuana is now prescribed medicinally in Canada with federal commitment toward legalisation. How substances are viewed across disciplines, cultures, and time is varied and contradictory. As Becker (1963) states, “deviance is not a quality of the act the person commits, but rather a consequence of the application by others of rules and sanctions to an ‘offender’ ... deviant behavior is behavior that people so label” (Becker, 1963, p. 9). Similarly, a substance is not classified as legal, medicinal, or acceptable based solely on pharmacological properties. For instance, Chomsky (2001) refers to tobacco as a “legal lethal,” in reference to the fact that it is the leading cause of preventable death in the United States and other developed countries (Deyton, Sharfstein, & Hamburg, 2010). In contrast, cocaine, is illegal and highly regulated. A research project designed and implemented by leading international researchers for the World Health Organization & United Nations Interregional Crime and Justice Research Institute (1995)

reported that cocaine is not “invariably harmful to health” and, in fact, health problems from the use of legal substances, namely alcohol and tobacco, are greater. Cocoa leaves were reported to have “no negative health effects and ... positive therapeutic, sacred and social functions for indigenous Andean populations” (World Health Organization & United Nations Interregional Crime and Justice Research Institute, 1995). An increase in education, treatment, and prevention programs was advocated to “counterbalance the current over-reliance on law enforcement measures” that are punitive and repressive (World Health Organization & United Nations Interregional Crime and Justice Research Institute, 1995, p. 7).

Empirical and theoretical investigations of substances use tend to dichotomise certain types of substance use. On one hand, prescribed use of pharmaceutical medication is acceptable and even advised, with particular emphasis on the potential therapeutic properties and subtle acceptance of the less desired “adverse effects.” On the other hand, illicit substances, certain patterns of licit substances, and non-prescribed use of pharmaceutical medication are frequently discussed in relation to potential risk for harm or experience of negative consequences is the focus of attention, with a bias that neglects or minimises potential benefits. When identifying benefits, we the authors do not suggest this means “acceptance,” but rather “acknowledgement” that perceived and actual benefits exist. For instance, while the sanctioned use of lithium poses an adverse effect of cognitive impairment such as psychomotor speed and verbal memory (McKnight et al., 2012), non-prescribed use of Adderall may present the advantage of improved concentration. Enck (2014) offers an argument that medical students may have a responsibility to take performance-enhancing substances that improve concentration, focus, and subsequent clinical outcomes. In this paper, we strive to understand the benefits and incentives for substance use, but do not advocate its reliance.

In this review, attempt is made to interpret data neutrally and suspend views of substance use as inherently good or bad, harmful or beneficial. The terms “misuse” and “abuse” are used in the results section to reflect the language used by the researchers cited, recognising that authors vary in their definitions of the terms. The terms “abuse” and “dependence” may refer to evaluative findings according to diagnostic criteria. Interpretation of risk for harm and negative consequence should be approached with an awareness that professionals often have access to resources that mitigate the severity of problems associated with substance use, such as financial security, housing, social capital, and reasoning skills. Accordingly, assumptions that any use of substances will necessarily result in harm should be carefully examined and based on available evidence. Research methodology and design influence the scope of data collected and impacts the extent to which informed evaluations of harm and risk are empirically supported and validated.

Professionals are typically defined as being members of a profession-specific society, association, college, and/or regulatory body; subject to a code of professional ethics or code of conduct; and/or subject to professional licensure or accreditation. There is a predominant perception that professionalism is incongruous with substance use, where there are high expectations for self-regulation, risk management, adherence to professional standards, and modelling social values. Professionals are expected to model ideal standards of living and are ethically obliged to ensure optimal performance for social good. Illicit substance use is often regarded as unethical and irresponsible. Professionals are often reluctant to discuss personal substance use or to ask for help due to fears of punishment, discipline, and negative appraisal (Lillibridge, Cox, & Cross, 2002; Monroe, Kenaga, Dietrich, Carter, & Cowan, 2013). Given the potential consequences associated with self-disclosure of substance use, professionals may

conceal substance use until problems escalate and job performance is impaired to the extent that others intervene.

Substance use by professionals can be a critical concern as they are accountable to protect public safety, which can be impeded by using substances that impact job performance. Consequences of substance use among this population can include failure from education programs, loss of employment, experiences of ongoing mental health concerns, and development of physical health problems (Cleary, Horsfall, Baines, & Happell, 2012; Pregoner, 1993). It is therefore important to understand the incentives for substance use and propensity for undesired or unintended consequences. Incentives for use may be explored in relation to desired *effects* of a substance or a perceived *reason* (e.g., intrinsic motivation, external influence). Nuanced understandings about incentive for use will ideally distinguish between effects and reasons to inform interpretations, recognising that the ability to determine causality are limited and dependent on the research design.

Methods

A literature review of English, peer-reviewed journals and professional journals published during or prior to 2015 was conducted using multiple databases, including SocIndex, PsychInfo, EMBASE, CINAHL, Medline, and PubMed,. Additional articles were identified through review of reference lists. Both authors conducted a separate literature review, then compared discrepancies and discussed inclusion and exclusion decisions.

Search criteria included combining profession-related terms with substance-related terms. Examples of search terms for professions are listed in Table 1. Professionals are typically defined as being members of a profession-specific society, association, college, and/or regulatory body, subject to a code of professional ethics or code of conduct, and/or subject to professional

licensure or accreditation. In some instances, data was reported on a broader subset (e.g. flight crew data includes pilots) and reported, given the paucity of data within the professional field.

Search terms to identify substance use included specific substance names (e.g. “alcohol,” “cocaine,” “Adderall”), “substance use,” “substance abuse,” “substance dependence,” “drugs,” “drug use,” “cognitive enhancement,” “performance enhancement,” or “medication.” No limits were placed on the earliest date of publication, since some professional categories had few publications.

Articles were evaluated for inclusion or exclusion at two stages, listed in Table 1. Stage 1 involved title and abstract review; 382 articles were selected. It was not feasible to track and report the number of articles excluded during Stage 1. Unlike other groups of people who use substances, profession and substance use search terms were *more* likely to identify issues related to professional role (e.g., nurses role in addressing smoking cessation with clients) than personal experience (e.g., nurses’ experiences of smoking). Several articles addressed more than one profession and are subsequently included in *each* professional category in Table 1.

At Stage 2, articles were included if they reported empirical findings of original research and the research specifically described substance use (e.g. type of substance used, patterns of use, reasons for use) by professionals or students in professional programs; descriptive articles (e.g., use, regulation, or management) (n=169), commentaries (n=6), conference abstracts (n=5), professional role (n=1), literature reviews (n=25), case studies (n=2), and treatment or outcome studies (n=22) were excluded. Articles with insufficient data about substances or substance use, or that collapsed substance use under the category of mental health (e.g. Lalloo, Ghafur, & Macdonald, 2013) were excluded (n=41). Of the 382 articles, 130 articles met the inclusion criteria and 252 articles were excluded. Many excluded articles focussed on recommendations

for surveillance, detection, and remediation with respect to regulation, professional codes of conduct, patient safety, diversion, and features of impaired practice. A substantial number of included articles were found in the categories of the health professions, including “allied health professionals” (n=10), “nurses” (n=26), “physicians” (n=30), “medical students” (n=55), and “pharmacists” (n=16).

[INSERT TABLE 1 HERE]

Data extraction targeted information regarding population demographics, research methodology, and direct findings pertaining to i) types of substances used; ii) prevalence of use; iii) self-reported effects of the substance(s); and iv) contextual factors reported to influence use. Early data extraction was conducted by the second author, which was reviewed and completed by the first author.

Data elicited from participants recruited solely from treatment programs or state monitoring programs were analysed separately. These participants are more likely to have experienced complex circumstances associated with their substance use (Centre for Addiction and Mental Health, 2001) and subsequently to adopt and reify therapeutic language and interpretations of their experiences (Carr, 2011; Gubrium & Holstein, 2003; Guilfoyle, 2006; Valverde, 1998).

Results

130 articles were included in the analysis, listed in Table 2. Of these, several articles referred to the same dataset, resulting in 114 unique research studies.

[INSERT TABLE 2 HERE]

Summary of study methodology

105 articles involved anonymous self-administered survey methodology (mail, in-person, or online). These were primarily cohort study or cross-sectional design (n=102). Three articles reported findings of two longitudinal studies (Croen et al., 1997; Newbury-Birch et al., 2002; Newbury-Birch et al., 2001). Response rates ranged from 6.1% (Joos et al., 2013) to 100% (Ahmadi et al., 2001; Newbury-Birch et al., 2000). Response rates were highest when distributed in person (average 74% across studies) and declined when distributed by mail (average 61%) or online (average 38%). Lower response rates may impact reliability of findings given the potential for response bias. High response rates may indicate an obligation, particularly when surveys were distributed in class, and students may have been less truthful in their responses.

Two articles used surveillance data (Li et al., 2005; Warner et al., 2013). Three articles reported and analysed interview data from national surveys (Hughes et al., 2002; Smith, 2007; Trinkoff, Eaton, & Anthony, 1991a). Nineteen articles reported findings from studies that recruited professionals who had accessed treatment or were identified as having work performance concerns; these are indicated in Table 2 with an asterisk (*). Of these, eleven articles reported findings based on review of clinical documents (Brooke et al., 1993; Comin et al., 2014; Cottler et al., 2013; Janik & Kravitz, 1994; Rojas, Brand, et al., 2013; Rojas et al., 2014; Rojas, Jeon-Slaughter, et al., 2013; Shaw et al., 2004; Stuyt et al., 2009; Sweeney et al., 2004; Wunsch et al., 2007). Seven of the articles involved interview methodology, drawn from five studies. Three of these studies involved participants recruited from substance use treatment settings, with one study reported in two articles (Alves et al., 2012; Dabney & Hollinger, 2002; Dabney & Hollinger, 1999; Lillibridge et al., 2002). Those not recruited from treatment settings included Meyers & Perrine (1996) and Shore (1997, 2001). Two studies used focus group methodology with participants recruited from a state monitoring program (Merlo et al., 2012;

Merlo, Singhakant, et al., 2013). One randomised control study investigated the effects of nicotine, donepezil, and alcohol on pilot flight performance (Mumenthaler et al., 2003).

Reasons for substance use

Thirty-five articles provided self-reported data about the effects of substances. The effects of alcohol were reported in six articles (Budhathoki et al., 2010; Kriegler et al., 1994; Newbury-Birch et al., 2001; Newbury-Birch et al., 2000; Ross & Ross, 1995; Yang et al., 2001). Data was collected in surveys as “reasons for use,” including:

- Newbury-Birch et al. (2000): Pleasure (92%)
- Budhathoki et al. (2010): Fun/trip (64.4%), can’t resist (20%), peer pressure (7.7%), relieve frustration of studies (7.7%)
- Kriegler et al. (1994): Social gesture (29.5%), enjoy the taste (29.5%), enjoy the feeling (14.9%)
- Newbury-Birch et al. (2001): Anxiety/stress (28%), habit (25%), increase confidence (18%), social pressures (12%), exam/work pressures (12%)
- Yang et al. (2001): Attending social activity, tension release

Most commonly reported reasons for why a professional pilot might misuse alcohol included the inability to control alcohol use, personal problems at home, a belief that alcohol helps a person relax, wanting to be part of the groups when crew members socialise during layovers, and financial problems at home (Ross & Ross, 1995).

Psychostimulants include amphetamines and medications for Attention Deficit Hyperactivity Disorder (ADHD) medications [e.g. Methylphenidate (Ritalin)]. The effects of stimulants were reported in eight articles (Baldwin Jr et al., 1991; Emanuel et al., 2013; Habibzadeh et al., 2011; Herman et al., 2011; Hughes & Conard, 1991; McNeil et al., 2011;

Petroianu et al., 2010; Volger et al., 2014). Reasons for use of stimulants, collected through survey methodology, were predominantly to enhance wakefulness (Habibzadeh et al., 2011; Petroianu et al., 2010), enhance alertness (Hughes & Conard, 1991), improve attention and concentration (Emanuel et al., 2013; Habibzadeh et al., 2011; McNiel et al., 2011; Volger et al., 2014), aid with studying (Emanuel et al., 2013), and improve academic performance (Hughes & Conard, 1991). McNiel et al. (2011) found that 17% used psychostimulants for recreation, 70% to improve attention and/or concentration, and 13% to obtain higher grades. Adverse effects were reported to include sleep disturbances, irritability/agitation, loss of appetite, shaking/tremors, visual disturbances, and xerostomia (McNiel et al., 2011).

The effects of caffeine were reported in two articles (Lee et al., 2009; Yang et al., 2001) and the effects of energy drinks were reported in one article (Aslam et al., 2013). Aslam et al. (2013) found that 40% of medical students in Pakistan used energy drinks. Perceived advantages of energy drinks included promoting wakefulness (47.4%), enhanced performance with studying or major projects (52.5%), improved energy levels (35.4%) and refreshment (44.9%) (Aslam et al., 2013). Withdrawal effects included fatigue (31.7%) and weight gain (29.4%). Lee et al. (2009) reported that 93.6% medical students in South Africa drank caffeine and Yang et al. (2001) found 86.7% of nurses in Taiwan drank caffeine. Nurses reported they enjoyed the taste of the beverages and caffeine enhanced work performance (Yang et al., 2001). Reasons for use among the medical students included enjoying the taste (72.4%), social engagement (70%), enhanced academic performance (62.6%), aid in recovery from hangover (11%), increased vigilance when driving (10.7%), and enhanced sport performance (4.7%) (Lee et al., 2009).

The effects of tobacco were reported in six articles (Berkelmans et al., 2011; Budhathoki et al., 2010; Hughes & Conard, 1991; McKenna et al., 2001; Newbury-Birch et al., 2000; Yang

et al., 2001). Reasons for use included addiction/dependence/habit, pleasure/enjoyment/fun, and relaxation/relieve frustration/tension release (Budhathoki et al., 2010; Hughes & Conard, 1991; McKenna et al., 2001; Newbury-Birch et al., 2000; Yang et al., 2001). Reason for not quitting included stress and weight gain (Berkelmans et al., 2011).

Eleven articles reported reasons for use of psychoactive substances collectively, including predominantly illicit substances and pharmaceutical substances (Ahmadi et al., 2001; Ahmadi et al., 2004; Boniatti et al., 2007; Carvalho et al., 2008; Hughes & Conard, 1991; Hughes et al., 1992; Khanal et al., 2010; Kriegler et al., 1994; Newbury-Birch et al., 2001; Newbury-Birch et al., 2000; Sahraian et al., 2010). In these instances, it was not possible to differentiate the effects of specific substances or groups of substances. Reasons for use included pleasure (15.4 to 66%) (Ahmadi et al., 2001; Boniatti et al., 2007; Khanal et al., 2010; Newbury-Birch et al., 2001; Newbury-Birch et al., 2000; Sahraian et al., 2010), curiosity (39.1 to 59.7%) (Boniatti et al., 2007; Carvalho et al., 2008; Sahraian et al., 2010), and experimentation (31.6 to 42.3%) (Khanal et al., 2010). Substance use was also reported to increase academic, social, and sexual performance (5.6%) (Boniatti et al., 2007). Hughes & Conard (1991) reported that illicit substances were frequently used to “feel good” and for experimentation, while stimulants were used to enhance work performance, and pharmaceutical substances were used for “self treatment,” to relieve stress or tension. Boniatti (2007) reported that 18% of medical students use substances to soothe psychological tension. Sahraian et al. (2010) reported effects of tension relief (8.9%) and reduced feelings of depression (1.3%).

The perceived effects of distinct pharmaceutical substances, such as analgesics, benzodiazepines, and opiates, were reported in four articles (Hughes & Conard, 1991; Morissette & Dedobbeleer, 1997; Trkulja et al., 2003; Yang et al., 2001). Reasons for use included pain

management, sleep induction, anxiety relief, enhanced work performance, and appearing calm at work (Hughes & Conard, 1991; Morissette & Dedobbeleer, 1997; Trkulja et al., 2003; Yang et al., 2001).

Deressa & Azazh (2011) found the past-year prevalence of using khat by medical students was 9% by men and 1.5% by women. The reasons for using khat were reported as effective reading and studying (68%), enjoyment (63%), and “to get rid of sleeplessness” (43%) (Deressa & Azazh, 2011). Among medical students, 12.8% reported a lifetime prevalence of using marijuana. Reasons for using marijuana included relief of frustration from studies (9%), peer pressure (3%), fun/“trip” (67.2%), and can’t resist (20.8%) (Budhathoki et al., 2010).

Six articles explored the effects of substances as reported by participants recruited from treatment programs or state monitoring programs in the United States (Dabney & Hollinger, 2002; Dabney & Hollinger, 1999; Lillibridge et al., 2002; Merlo et al., 2012; Merlo, Singhakant, et al., 2013; Merlo, Trejo-Lopez, et al., 2013). Dabney & Hollinger (2002) found that pharmacists initiated recreational use of pharmaceutical medication largely out of curiosity. It was found that these substances were easily available during pharmacy education and practice, and more accessible than illicit substances. Dabney & Hollinger (1999, 2002) categorised the participants as “therapeutic self-medicators” and “recreational abusers.” Therapeutic medicators were pharmacists who had little personal experience with substance use prior to their use of a substance that later became problematic. The substance was initiated in response to a difficult life situation, accident, medical condition, or occupation-related pain, and generally at the recommendation of a co-worker or senior pharmacist (Dabney & Hollinger, 2002). In these circumstances, substances were used to treat specific symptoms and facilitate engagement and performance at work. Those who were classified as recreational users of pharmaceutical

substances reported being attracted to pharmacy as a profession in order to expand their personal substance use experiences. Substance use was viewed as a means for self-exploration and as an opportunity to inform patients more accurately about effects (Dabney & Hollinger, 2002). One participant described that to be a “true researcher” and contribute to “constant improvement,” one must be willing to experiment on oneself (Dabney & Hollinger, 1999). At later stages, substance use was maintained in order to avoid withdrawal symptoms (Dabney & Hollinger, 1999).

Lillibridge et al. (2002) heard from nurses that substance use was a strategy to respond to work-related stress (e.g. complexity of role, lack of funding and resources, occasional traumatic nature). Substances could also balance the disruptions of shift work on life patterns, energy, and coping. On one hand, substances could facilitate feeling better and provide a means to manage the stress of high expectations placed on nurses. On the other hand, nurses reported feelings of guilt, shame, and loss of control when they perceived personal substance use as contravening the ideal standards associated with being a nurse.

Merlo et al. (2012) reported that some pharmacists used pharmaceutical substances recreationally and others experienced iatrogenic dependence. Pills were described as compact and easier to conceal than other substances, such as alcohol or marijuana. The most common reasons for using substances by a group of physicians was reported to be management of physical pain (resulting in iatrogenic dependence), management of emotional or psychiatric distress (e.g. anxiety, depression), alleviation of stress, alleviation of withdrawal symptoms, and effect alteration of a recreational substance (e.g. to enhance or counteract the effects) (Merlo, Singhakant, et al., 2013). Merlo, Trejo-Lopez, et al. (2013) found health professionals reported using substances out of curiosity and a desire to fit in. The euphoric effects were desired and

substances often operated to relieve anxiety, stress, and depression, to facilitate feeling comfortable in social settings, and to deal with having a difficult job.

Factors that contributed to substance use included ease of access in the workplace and normalisation associated with regular dispensing, advocacy by pharmaceutical companies, and unofficial practices that condone diversion of medications, such as ibuprofen or cough suppressant, in the workplace (Dabney & Hollinger, 1999; Lillibridge et al., 2002; Merlo et al., 2012; Merlo, Trejo-Lopez, et al., 2013). Factors of professional socialisation further included relaxed attitudes to occasional substance use, heavy social drinking and drug use during social gatherings, and modelling of substance use by preceptors (Dabney & Hollinger, 1999).

Variables associated with substance use

While many articles focused exclusively on prevalence, approximately a third reported relational data. Statistical analyses included student t-tests, chi-square analysis, univariate analysis, multivariate analysis, and/or logistical regression. Variables selected for review in this review include specific demographic characteristics (sex, religion), mental health or psychiatric factors, profession and specialisation roles, and comparison to the general public. For sake of conciseness, demographic factors less related to the research question are not summarised in this paper, including co-occurring substance use, age of initial substance use, living arrangements, marital status, and family history of substance use. The data summarised in this section were reported to meet criteria for statistical significance as identified by the authors.

i) Demographic characteristics of professionals and students.

Male sex was reported to be predictive of substance use in several studies (Akvardar et al., 2003; Emanuel et al., 2013; Makanjuola et al., 2007; Naskar & Bhattacharya, 1999; Watts et al., 1991). Masculine gender was significantly correlated with controlled substance use (Bell et al., 1999),

frequency of marijuana use (Di Pietro et al., 2007), frequency of methylphenidate/Ritalin use (Habibzadeh et al., 2011), Lanca use (Mesquita et al., 1998), and alcohol and inhalant use among medical students (Passos et al., 2006).

One study found that men were more likely to frequently smoke tobacco and drink alcohol than women, while women were more likely occasionally to use analgesics, codeine and other narcotics (Brewster, 1994). Women were also found to be more likely to report lifetime use of tranquilizers (Passos et al., 2006).

Being male was associated with higher prevalence of alcohol related problems (Beck et al., 1995) and alcohol (Chiles et al., 1990). Men were more likely than women to score in the range of problem drinker on the Michigan Alcoholism Screening Test (MAST) (Benjamin et al., 1990; Winwood et al., 2003). Other articles reported no significant difference between sexes (Buchanan & Pillon, 2008; Bucher et al., 2013). One study found no difference between men and women with regard to the quantity of alcohol consumed; however, men were reported to engage in more frequent business-related alcohol consumption (Shore, 1997; Shore, 2001).

Several studies reported on prevalence of substance use throughout the professional education program and in relation to number of years of professional practice. Being a senior student (versus a junior student) was predictive of substance use (Akvardar et al., 2003). Another study found that upper-year female students reported higher frequency of tranquilizer use and lower frequency of cannabis use as compared to lower-year female students (Da Silveira et al., 2008). In a 4-year longitudinal study, Newbury-Birch et al. (2001) found that mean alcohol consumption significantly increased by both men and women and the proportion of individuals drinking above the recommended safe limits had also significantly increased. Similarly, non-users of substances were more likely to be first-year students (Emanuel et al., 2013). Contrary to

the previous findings, the number of years of study was not found to be significantly associated with substance use in one study (Bucher et al., 2013).

The findings regarding years of professional practice are much more mixed. Higher number of years of practice was significantly correlated with controlled substance use in two studies (Bell et al., 1999; Winwood et al., 2003) and a positive correlation was found between age and years of teaching with amphetamine use in past-year and past-month (Watts & Short, 1990). Scores on the MAST that were above the cutoff to indicate possible or probable alcohol related concerns were correlated with older age in two studies (Beck et al., 1995; Benjamin et al., 1990).

Current use of narcotics was associated with younger age (Brewster, 1994), and physicians over 40 years old were less likely to have ever used a psychoactive substance recreationally (McAuliffe et al., 1986; McAuliffe et al., 1987). There was a reported inverse relationship between number of years of teaching with lifetime marijuana, cocaine, and narcotic use (Watts & Short, 1990).

The impact of religious belief on substance use was reported in several articles. Having a religious belief or engaging in religious practices was associated with lower substance use in many studies (Boniatti et al., 2007; Makanjuola et al., 2007; McAuliffe et al., 1986; McAuliffe et al., 1987; Raistrick et al., 2008). Not practicing a religion was positively correlated with using marijuana (Di Pietro et al., 2007) and not going to church was correlated with increased inhalant use (Boniatti et al., 2007). One study reported found that Muslim students were less likely to drink alcohol in the past year and more likely to use khat (Deressa & Azazh, 2011). A single study reported no significant difference with respect to religion or religious practice (Buchanan & Pillon, 2008).

ii) Substance use and mental health.

Evidence to support a conclusive relationship between substance use and mental health or psychiatric variables was relatively sparse and significance of associations was often weak. Mankjuola et al. (2007) reported a negative correlation between substance use and mental health. Bucher et al. (2013) reported a correlation between psychostimulant use and aggressive-hostility personality. Chiles et al. (1990) reported a correlation between cigarette use by men and psychiatric symptoms (not otherwise defined). Among a group of police, hazardous or dependent alcohol use was predicted by greater subjective reports of posttraumatic distress, depression, and PTSD avoidance symptoms (Chopko et al., 2014). Leignel et al. (2014) found that in a sample of pharmacists, smoking, alcohol “abuse,” anxiolytic and hypnotic use predicted poor mental health. In the same study, in a sample of lawyers, the predictive factors of poor mental health were being a woman, being widowed or divorced, plus smoking and anxiolytic use (Leignel et al., 2014).

Weak relationships were reported in several studies. Maddux et al. (1986) investigated substance use in relation to withdrawn depression, agitated depression, somatic depression, dishonesty, rebelliousness, intolerance for distress, reliance on medication. The only significant correlation found was between use of marijuana, cocaine, or hallucinogens with “withdrawn depression” (emptiness, loneliness). Jex et al. (1992) investigated the relationship between stressors (death/suffering, abusive/non-compliant patients, sleep deprivation, excessive work hours, difficulty adjusting to work schedule) and strains (general psychological strain, work-related psychological strain, general behavioural reactions, work-related reactions) on substance use. They reported only weak correlations, with benzodiazepines being more strongly related to strains than any other substances. In a longitudinal study designed to examine the relationship

between multiple substances, anxiety, depression, stress, a weak negative correlation was found between alcohol consumption and anxiety (Newbury-Birch et al., 2002; Newbury-Birch et al., 2001). In another study, Watts et al. (1991) found that correlations between stress in relation to variables of depression and substance use were weak; depression correlated with heavy alcohol use, lifetime use of hallucinogens, and drug use in past year and month, while thoughts of suicide correlated with substance use. Choi et al. (2013) found student who used stimulants were 23% more likely to report past-year suicidal ideation compared to those who did not. Watts, et al. (1990) found a weak correlation between marijuana and the stress variable “job overload” and a correlation between amphetamine use and “collegial relations.”

Brooke et al. (1993) reviewed the case notes of physicians who entered treatment for substance use and concluded the most frequent reported pathways into substance use were personality difficulties (76 subjects, 52.8%) and anxiety or depression (46 subjects, 31.9%). A retrospective review of medical records of nurses and physicians who used substances and were admitted to a psychiatric unit found that 41% met the criteria for a mental health disorder, 28% met the criteria for depression, and 8% met the criteria for attention deficit hyperactivity disorder (Comin et al., 2014)

Other studies demonstrated no significant relationship between mental health indicators and substance use. Akvardar et al. (2003, 2004) found no relationship between high levels of anxiety and depression and cigarette or alcohol use. Similarly, Pickard et al. (2000) found that high levels of anxiety or depression did not correlate with high levels of substance use. Newbury-Birch et al. (2000) found no correlation between frequency of exercise, anxiety, depression, or stress on alcohol/substance use. Furthermore, personal or patient-related stress did not predict substance use (Winwood et al., 2003).

iii) Professions, specialisation, and substance use.

Several studies compared substance use between professional groups and across specialisations. Key identified differences are summarised in this section, though the summary is not exhaustive. Findings from Kenna & Wood (2004a, 2004b) are included in the following section, as their analysis includes comparison to the general population.

Professions.

In a study by Brewster (1994) regarding use of substances by physicians, nurses, and lawyers in Canada, key distinctions emerged with regard to alcohol consumption. Pharmacists (29.8%) reported more “occasional use” of alcohol (once per month or less) than lawyers and physicians, while lawyers (60.4%) reported more “regular use” (more than once per month) than pharmacists and physicians. It was also found that psychiatrists were most likely to report past and current use of benzodiazepines.

In a study of health professionals who underwent fitness-for-duty evaluation testing, pharmacists were significantly more likely to report higher rates of opioid “abuse” than nurses and physicians, whereas nurses reported higher rates of benzodiazepine “abuse” than physicians (Rojas, Jeon-Slaughter, et al., 2013). No other significant differences were found.

In a study of professional women in Canada, including teachers, lawyers, social workers, and nurses, Morissette & Dedobbeleer (1997) did not find any significant difference in substance use across the professions. Another study of physicians found that professional role did not sufficiently explain differences in substance use, but socioeconomic status did (Hughes et al., 1992).

Dental and medical students.

A longitudinal study of dental and medical students (Newbury-Birch et al., 2002) found that current marijuana use among final-year medical students (22%) and first-year physicians (24%) was higher than final-year dental students (8%) and first-year dentists (16%). Dental students were more likely to drink at hazardous levels compared with the medical student group. Over the three points of data collection, approximately one-third of the dental student cohort reported binge drinking, whereas less than a fifth of the medical student group reported binge drinking.

Nursing specialisation.

Other studies undertook to explore differences according to specialties within professional groups or factors within the role demands. Collins et al. (1999) compared the prevalence of substance use by nurses across twelve categories of specialties. They found a higher prevalence of smoking cigarettes among nurses who worked in geriatric or psychiatric/mental health settings. Lifetime use of cocaine was higher among nurses in critical/intensive care and lower among nurses in geriatrics and paediatrics/obstetrics-gynaecology. Lifetime use of hallucinogens was higher among nurses in critical/intensive care and lower among nurses in geriatrics. Nurses who worked in hospitals reported higher lifetime use of alcohol, marijuana, and tranquilizers than non-hospital nurses.

Trinkoff & Storr (1998a) found that among a cross-section of nurses, binge drinking was most prevalent in oncology, emergency, and paediatric critical care. Past-year marijuana or cocaine use was most likely in emergency settings, at 7%. When sociodemographic factors were accounted for, prevalence was reported to be 3.5 times higher among this specialty. Use of prescription-type substances was most prevalent by nurses in oncology, rehabilitation, and

psychiatry. Berkelmans et al. (2011) found that nurses who smoked were more likely to work in psychiatry or emergency settings.

With respect to work demands as an aspect of professional role, it was found that nurses who worked night shifts longer than eight-hours demonstrated the highest likelihood of alcohol use and smoking and nurses who worked rotating shifts were 50% more likely to report alcohol use (Trinkoff & Storr, 1998b).

Medical and dental specialisation.

Among physicians admitted to a monitoring program (Stuyt et al., 2009), psychiatrists were most likely currently to use tobacco (48.8%) while paediatricians were least likely (27.3%) (Berkelmans et al., 2011). Hughes et al. (1999) examined past-year substance use according to eleven medical specialty categories. Prevalence of tobacco use was 13.7%, with physicians in surgery and emergency medicine twice as likely to use tobacco. Overall prevalence of marijuana use was 4.6%, twice as likely to be used by physicians in emergency medicine. Past-year prevalence of cocaine was 1.1%. The prevalence of cocaine use by physicians in emergency medicine was twice the norm, but did not meet statistical significance. Use of benzodiazepines was 11.4% overall, and more commonly used by physicians in psychiatry. Minor opiates were used by 17.6%, and were more commonly used in family practice and obstetrics/gynaecology. Minor opiate were less commonly used in anaesthesiology and psychiatry specialties. Prevalence of major opiates was 1.1%, and were more likely used by emergency medicine, anaesthesiology, and chronic pain specialists, though low prevalence impedes drawing conclusions with confidence.

Joos et al. (2013) investigated the use of alcohol according to seven categories of medical specialty. Female surgeons demonstrated higher rates of monthly binge drinking compared to

other medical disciplines. However, no other significant difference in drinking was found across medical specialties. (Shore, 2001) noted similar findings about alcohol use among lawyers. Overall, no difference was found in frequency or quality of alcohol consumption with regard to type of practice. However, women whose caseload included ‘most’ or ‘all’ criminal litigation consumed a larger quantity of alcohol in social drinking.

It was found that physicians involved in teaching, research, and administration reported lower rates of substance use (McAuliffe et al., 1986). Otherwise, no significant difference related to specialty was identified with regard to substance use (McAuliffe et al., 1986). Substance use and risk for dependence were higher among pharmacists who worked in sales, non-traditional settings, and health maintenance organisations and clinics; substance use and dependence was lower among hospital pharmacists (McAuliffe et al., 1987).

In a study of alcohol use by dentists, Winwood et al. (2003) found that working in private practice was more predictive of high scores on the Alcohol Use Disorders Identification Test (AUDIT), which is a screening tool to identify potential problematic use.

iv) Use by professionals in comparison to general population.

Five studies examined the use of substances by professional groups in comparison to the general population. Overall, research suggests that professionals use substances similar to the general population, with some evidence of higher frequency among health professionals with respect to certain pharmaceutical substances.

Blazer & Mansfield (1995) compared substance use across female nurses, female clerical workers, and females in trade jobs. They found that participants in trades jobs (44.2%) smoked more than nurses (19.8%) and clerical workers (21.8%). Participants in nurse group and trades group drank more alcohol than the clerical group. Participants in trades jobs reported more

moderate marijuana, inhalant, opiate, hallucinogen, and cocaine/crack use than nurses and clerical workers. Nurses reported higher prevalence of moderate use of non-prescription substances (including pain relievers, sleep aids and non-prescription stimulants) (83.4%), compared to clerical (31.8%) and trades workers (32.4%). Probability values were not provided.

Cottler et al. (2013) performed a comparison of substance use that involved physicians who were referred to a Physician's Health Program in the United States as a result of suspected substance use impairment. The comparison group was matched from participants of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) Wave 1 who answered affirmatively to the questions "Ever Sought Help Because of Drinking" or "Ever Sought Help Because of Medicine or Drug Use." Matches were performed on a 1:1 ratio based on age, gender, and education status. Analysis was performed using prevalence rates, conditional prevalence, and odds ratios. No significant difference was found in lifetime use of alcohol, opiates, and sedatives; however, physicians demonstrated higher rates of lifetime alcohol, opiate, or sedative abuse or dependence. Physicians had lower lifetime tobacco dependence. They also had lower lifetime use, but higher lifetime abuse or dependence for cocaine/crack and cannabis. Findings showed that physicians had lower lifetime use of amphetamines, though no difference in abuse or dependence.

Hughes et al. (2002) used data from the National Longitudinal Study of Labor Market Experiences of Youth (NLSY) in the United States to compare substance use by nurses with a matched sample. The use of "any illicit substance" and use of "any illicit substance 10 times or more" was higher among the match control group. However, there was no significant difference of use when substances were considered individually. Overall, there was no significant difference with regard to prevalence of pathological use of alcohol or illicit substances.

Kenna & Wood (2004a) conducted a survey with dentists, nurses, pharmacists, and physicians and compared the findings with the National Household Survey on Drug Abuse (NHSDA). Health professionals reported higher lifetime and past-year nonmedical use of opiates, anxiolytics, and sedative-hypnotics than the general population. Nurses, pharmacists, and physicians reported higher frequency of past-month use of minor opiates and anxiolytics than the general population. Occasional use of opiates and anxiolytics by pharmacists was reported to be quite high. Dentists reported twice as frequent weekly and daily alcohol use compared to other health professionals and to the general public, and more heavy episodic alcohol use within the past month.

Kenna & Wood (2004b) presents the findings of a survey that involved nurses, nursing students, pharmacists, and pharmacy students in the United States. The information collected from nurses and pharmacists is compared to data from the National Survey on Drug Use and Health. Information collected from nursing students and pharmacy students is compared to data from the Monitoring the Future project regarding substance use by college students. Results indicated that nurses and pharmacists reported slightly higher prevalence of lifetime use of alcohol, but less heavy episodic use or heavy use. Nurses were more likely to have smoked cigarettes than pharmacists, but the past-month prevalence of smoking by nurses was approximately half compared to the general population. Pharmacists were more likely to have ever used opiates (24.8%), stimulants (15.8%), and anxiolytics (14.3%) compared to nurses; compared to the general public, they were more likely to use these substances more frequently.

Kenna & Wood (2004b) found that compared to college students, nursing and pharmacy students reported less heavy episodic alcohol use. Nursing students reported higher lifetime prevalence of tobacco compared to pharmacy students, but college students had higher daily use

than the professional students. Lifetime and monthly marijuana use were highest among nursing students. Lifetime use of opiates was significantly higher among nursing students than pharmacy students, though both were higher than the general college population. Nurses were also more likely to report lifetime use of anxiolytics, muscle relaxants, and sedative-hypnotics than pharmacy students.

v) Other variables.

There were a few distinct findings reported in single studies, unrelated to the preceding topics. Makanjuola et al. (2007) reported substance use positively correlated with self-reported study difficulty. This aligns with the finding that use of methylphenidate (Ritalin) was higher among students with grade average of 74% or less (Habibzadeh et al., 2011). With respect to practice settings, it was found that substance abuse education in the curriculum and workplace drug abuse resources negatively correlated with illicit prescription substance use, while presence of colleagues who use substances positively correlated with illicit prescription substance use (Hollinger & Dabney, 2002).

Discussion

This research demonstrates that prevalence and patterns of substance use and misuse by health professionals and students in professional programs tend to be similar to matched non-professional comparison groups (Cottler et al., 2013; Hughes et al., 2002; Kenna & Wood, 2004a; Kunyk, 2015). Physicians and pharmacists reported higher illicit use of opiates, anxiolytics, and sedative-hypnotics than the general population (Kenna & Wood, 2004a), and cocaine use among a sample of lawyers was higher than the general population (Benjamin et al., 1990). Among medical students, cognitive enhancement pharmaceuticals are common (Emanuel et al., 2013; Finger, Silva, & Falavigna, 2013). Sex and types of practice may impact patterns of

substance use. Female lawyers working in criminal litigation reported higher consumption of alcohol when drinking socially (Shore, 2001) and dentists in private practice demonstrated higher prevalence of problematic drinking than those in public practice (5.5%) (Winwood et al., 2003).

There is a marked gap in the literature with regard to the effects of substance use in relation to professional competence. Substance use by professionals has the potential to pose social burden by impacting family, colleagues, quality of services, safety, and access to services (Fung & Lange, 2011; Warner et al., 2013). Personal burdens may impair physical health, mental health, and well-being (Ratnasingham et al., 2013) and elicit feelings of shame when engaging in actions that contravene one's professional identity (Lillibridge et al., 2002). Economic burdens include loss of productivity and costs to employers, regulatory bodies and their members, and public health services (Georgemiller, Machizawa, Young, & Martin, 2013).

Despite recommendations regarding surveillance, detection, and remediation with respect to professional regulation, codes of conduct, patient safety, diversion, and features of impaired practice, there is little attention to distinguish non-problematic substance use from patterns of use that may impair professional performance. With the exception of medicine and nursing, there is limited scope of information about prevalence and patterns of use among most professional groups and the desired or beneficial effects that perpetuate substance use or the personal and work demands that influence decisions about use. Qualitative research may be ideal for learning more about aspects of the context and desired effects, which is largely unexplored.

This literature review reveals many inconsistencies regarding predictive factors of substance use, and exposes the limited number of studies pertaining to self-reported effects of substances. Indirect data about effects can be inferred based on "reasons for use." However, data

regarding reasons for use largely relied on pre-established survey options, and it would be erroneous to assume *reasons for use* equate to *effects*. Personal identification of a reason *why* one engages in substance use requires meta-cognition and is susceptible to attribution bias and awareness of tacit knowledge. This form of question also posits substance use as a negative that needs to be justified (Wong & Weiner, 1981). Research shows that retrospective self-reports about substance use are prone to recall bias, social desirability bias, and cognitive judgment bias (Berkman, Dickenson, Falk, & Lieberman, 2011; Krumpal, 2013; Mortel, 2008; Voogt et al., 2013). Real-time data collection provides a means to collect more accurate data, which may be used in future research about substance use.

Based on the findings, men are overall more likely to use substances than women, though some groups of women may be more likely to use certain substances. Having a religious belief or practice is generally predictive of lower prevalence of substance use. Students in professional programs are increasingly exposed to substance use; however, duration of professional practice reveals high variability in prediction of substance use. Higher number of years of practice may be associated with higher rates of possible or probable alcohol-related problems based on MAST scores, which may be logical as longer-term use can result in an accumulation of negative consequences. Pharmaceutical substance use may be more prevalent among some health professionals and students in health professions than the general public.

Stress, anxiety, and depression were evaluated in several studies, particularly with respect to education programs and careers that are considered to be highly demanding. Considering the large number of factors included in the analyses, there were relatively few statistically significant associations and those that did exist were often weak.

Some difference exists based on type of profession, professional program of study, and area of specialisation. Given the limited number of studies available on many professions, it is not possible to compare substance use or effects comprehensively. There is indication that prevalence of substance use in health professions may be higher among those who work in psychiatry, emergency medicine, and critical care settings.

Limitations of reviewed studies

Information about substance use among professionals and students in professional programs is largely skewed to medical students, medical residents, and other health professionals. There is limited research regarding other professionals (e.g. accountants, architects) and the existing research on some professions is relatively out-dated (e.g. pilots). Research methods predominantly relied on self-administered survey. While this affords opportunity to recruit large numbers of participants, it poses a disadvantage by confining the scope of responses to those that were pre-determined by the researchers. The theoretical perspectives influence the design and set parameters regarding the type and scope of data collected, making survey methodology susceptible to researcher bias.

Survey methodology poses a risk for response bias regarding factors that might influence participants to opt in or out of the study. Furthermore, accuracy of self-report is not verifiable. Shaw et al. (2004) reviewed the files of twenty non-responders and did not find any evidence of difference compared to the participant group. Kenna & Wood (2004a, 2004b) also performed statistical analysis that ruled out respondent bias. McAuliffe (1986) reported little response bias in surveys about substance use when the data is collected anonymously.

While the sample sizes of the studies were relatively large, there were small sample sizes for certain variables, which impacted the strength of the findings and reliability. For instance, in many studies the prevalence of using certain substances was less than 1%.

Across articles, there was little variety in scope of information collected, with a disproportionate focus on prevalence of use. The majority of surveys reviewed in this study did not provide opportunity for collection of qualitative data. Questions were purposefully designed primarily to elicit data about undesired or negative effects of substance use and largely neglected to elicit information regarding perceived benefits or desired effects. Most qualitative studies recruited participants from treatment programs or state monitoring programs. Collecting qualitative information from individuals who use substances in ways that have not been subject to investigation for problematic use would contribute to a nuanced understanding about substance use.

Limitations of the literature review

The search process was complicated by the search terms applying to both professional roles and personal experience and the number of possible keywords. Given these complications, it is possible that some relevant articles were not identified for inclusion in this study.

Viewing substance use as a phenomenon that is contextually and temporally bound, cross-sectional and cohort studies are appropriate for learning about the nature of substance use among a particular population at a particular period in time. Substance use is influenced by social norms, laws, availability, and access, which change over time. This limits validity of interpretations comparing substance use over time and across cohorts.

Conclusions

There is relatively little known about the effects of substance use on the performance or experience of professionals or students in professional programs. Opportunities for participant voice representation and guidance with respect to data collection may enhance current understanding of substance use. Self-disclosure about substance use can pose a career risk, so substance use is often only disclosed after a problem has been identified. Unfortunately, this produces a single narrative: namely, that substance use is problematic. Substance use by those who are not experiencing problems remain concealed. These factors limit understandings about controlled use, or how to intervene prior to the development of problems. Adopting various methodological approaches can contribute to rich knowledge about what substances are being used by professionals, incentives for use, perceived benefits, undesired effects and consequences, and professional socialisation processes that shape patterns of substance use.

There is significant potential to learn about the complex nature of substance use by collecting data about controlled, or even beneficial, use. The reported reasons for use include positive intentions, such as fun, pleasure, sleep, enhanced work performance, improved attention and concentration, and relaxation. More qualitative research about a comprehensive range of effects may provide insight to decisions about use and factors that influence use.

This is not to suggest that the authors advocate use of substances, be it prescribed, licit, or illicit; however, to exclude these perspectives from research limits understandings about this phenomenon and may limit the effectiveness of potential interventions, approaches, or policies. The United Nations Office on Drugs and Crime (2008) recommendations include preventing substance use, reducing adverse social and health consequences, and reducing the demand for substance use. In order to do so effectively the understanding that people opt to use substances, in spite of potential or actual negative consequences, because they are perceived to offer benefits

in some way should be realised. We see the value in a more deliberate understanding of substance use within context. For example, with 12.4% of dental students reporting non-medical use of a prescription stimulant (70% for improved concentration) (McNiel et al., 2011), it may be beneficial to explore factors such the influence of peers, modelling by practicing professionals, and level of academic performance demands. In order to reduce the reliance on cognitive enhancement substances, it might be valuable to address non-chemical means to improve concentration, academic performance, and clinical outcomes.

Tailored and targeted strategies are more relevant to the intended population and provide the opportunity to influence health behaviour change. Policy, prevention, early intervention, and intervention tends to focus on the individual (e.g. vulnerabilities, predisposing factors) and neglect social, institutional, cultural, and political contexts. Innovative approaches and policies to minimise undesired or unintended consequences associated with substance use, need to consider contextual factors that influence and shape substance use, individual appraisal of use, and availability of supports. When antecedents and stressors are amenable to change, there is a potential to extend this responsibility to universities, institutions, and professional organisations, who have a vested interest in supporting the well-being of their members and protecting the interests of the public (Baldwin, 2009; Cleary et al., 2012; Monroe, 2009). Developing a more nuanced understanding about contextual factors that impact substance use in workplaces and education contexts is critical. Qualitative methodologies may add depth and detail to building on existing quantitative data.

Substance use choices occur within a context and patterns of substance use are thus influenced by socialisation (Oetting & Donnermeyer, 1998; Oetting, Donnermeyer, & Deffenbacher, 1998). Substance use is pervasive within university culture, and research shows

that most professionals who use substances initiated use during or before their professional studies (Merlo, Trejo-Lopez, et al., 2013). It is imperative to consider factors that influence professional socialisation regarding acceptable and unacceptable substance use within professional groups. Messages about substance use are conveyed through professional scopes of practice that position one's own substance use as acceptable and normal in contrast to others (e.g. clients, patients) whose use is abnormal and deviant. There is also a need to explore professional socialisation regarding personal use in relation to work (Elnicki, 2013; Moisan et al., 2014), such as condoning pharmacological means to manage sleep or making light about using alcohol as a means to reduce stress, rather than promoting other types of health inducing changes.

Professionals and students in professional programs are a highly educated group, skilled at accessing information and discerning evidence from traditional health education and discourse about substance use. To affect change, approaches need to be relevant and based on relatable data. Creating spaces in professional and educational settings to discuss substance use more openly can prevent a shift toward problematic or harmful use. The findings showed that evidence for hypothesised predictive factors are relatively weak and disparate; therefore a deficits-based approach to understanding substance use among professionals may have limited explanatory power. Research needs to be designed to elicit anticipated and actual effects of substances, suspending assumptions that substance use is directly associated with risk for negative consequences.

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