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Review of cannabis use among Aboriginal and Torres Strait Islander people

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Review of cannabis use among Aboriginal and Torres Strait Islander people

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Abstract

The health effects of cannabis use may not always be seen as a high priority for Aboriginal and Torres Strait Islander communities. However, the impact of cannabis use on physical and mental health can have significant consequences. It is known that the use of high potency cannabis has increased over the last two decades, with a corresponding increased risk to health. In particular, young people are at increased risk of experiencing harms to mental health. Physical harms to health include effects on the respiratory system, cardiovascular system, an increased risk of cancer, and in-utero effects from maternal use. The review notes concern that in countries where there has been commercialisation of cannabis use, there has been an increase in the rate and use of high potency products. While generalising findings about cannabis use for Aboriginal and Torres Strait Islander people is problematic due to limited data, high rates of cannabis use have been found in some remote communities. The review highlights the protective factors that reduce harms from cannabis use and suggests future directions for a collaborative approach to addressing cannabis related harms in communities.

This review is part of a suite of knowledge exchange products that includes a summary, a video, and a fact sheet.

Cover Page Footnote

Special thanks are extended to the anonymous peer reviewer whose comments assisted in the finalisation of this review, staff at the Australian Indigenous Health*InfoNet* for their assistance and support and the Australian Government Department of Health for its ongoing support of the work of the Australian Indigenous Health*InfoNet*.

Keywords

Cannabis, marijuana, drug use, Aboriginal and Torres Strait Islander health, mental health, health effects, prevention, culturally secure, health promotion, screening, primary health care, strategies, policies

About this review

The purpose of this review is to provide a comprehensive synthesis of key information on cannabis use among Aboriginal and Torres Strait Islander people in Australia to:

- inform those involved or who have an interest in Aboriginal and Torres Strait Islander health and, in particular, cannabis use.
- provide evidence to assist in the development of policies, strategies and programs.

The review provides general information on the social and cultural context of cannabis use, and the factors that contribute to cannabis related harms. It provides information on the extent of cannabis use and discusses the protective and risk factors in relation to cannabis use. The review provides information on relevant programs, services, policies and strategies that address cannabis use among Aboriginal and Torres Strait Islander people. It concludes by discussing possible future directions for culturally secure approaches to addressing harms from cannabis use for Aboriginal and Torres Strait Islander people in Australia.

This review draws mostly on journal publications, government reports, national data collections and national surveys, the majority of which can be accessed through the Australian Indigenous Health *InfoNet*'s publications database: <https://healthinonet.ecu.edu.au/key-resources/publications>.

Information specifically about cannabis use can be found at: <https://aodknowledgecentre.ecu.edu.au/learn/specific-drugs/cannabis/>. This was not a systematic literature review in that not all articles were synthesised or assessed in the review. Rather, it was a scoping review, whereby the articles collected were used as the basis of the review, with further information sought during the drafting process.

The Health *InfoNet*, consistent with its nomenclature guide, prefers the term 'Aboriginal and Torres Strait Islander' rather than 'Indigenous Australian' for its publications. Also, some sources may use the terms 'Aboriginal' only or 'Torres Strait Islander' only. However, when referencing information from other sources, authors may use the terms from the original source. As a result, readers may see these terms used interchangeably in some instances. If they have any concerns, they are advised to contact the Health *InfoNet* for further information.

Introduction

Cannabis is the most widely used drug¹ worldwide (UNODC, 2020, 2021). The United Nations Office of Drugs and Crime (UNODC) estimates that there are approximately 200 million cannabis users across the globe (UNODC, 2021). Cannabis is illegal to cultivate, distribute and consume across much of the globe, despite recent changes in the Americas. In Australia, cannabis is listed as a narcotic drug under the Narcotics Drug Act, 1967 (Australian Drug Foundation, 2021); although laws vary between the states it is illegal to cultivate, possess, supply, use, or drive under the influence of cannabis. In both South Australia and the Australian Capital Territory possession of small amounts of cannabis for personal use is legal (Australian Drug Foundation, 2021).

The term cannabis refers to the plant *Cannabis sativa* L, and its products including dried leaf and bud matter, and resin. Although debated in the literature, *Cannabis sativa* L. is currently classed as monospecific; it has two subspecies – *Sativa* and *Indica* – and a further four varieties (Bloomfield et al., 2019; UNODC, 2021). Cannabis is grown in many regions around the world, including Australia, and the majority of cannabis trafficking in Australia is intrastate, although the international illicit trade does provide cannabis to the Australian market (UNODC, 2021). Cannabinoids are the psychoactive substances in cannabis. To date, 120 phytocannabinoids have been identified for *C. sativa*. The main psychoactive cannabinoid is delta9-tetrahydrocannabinol (THC) (UNODC, 2021). Cannabis is typically consumed to experience the effects of THC. Another cannabinoid of note is cannabidiol (CBD). CBD does not have the same psychoactive effects as THC and may moderate some of its effects (Bloomfield et al., 2019). In the following paper, the term cannabis use relates to the use of THC containing plant material (leaves, buds, oil and resin) for recreational purposes. The following paper does not discuss the use of cannabis extracts, medicinal cannabis or synthetic cannabis.

There are three main cannabis products, these are the dried leaf and bud material (herb or marijuana), cannabis resin (hashish) and cannabis oil (derived from the resin – hashish oil) (Australian Criminal Intelligence Commission, 2020). In Australia cannabis is known by a wide variety of slang terms including: gunja, ganja, weed, grass, pot, dope, mull, yarndi, hydro, Mary Jane, and choof among others (Australian Drug Foundation, 2021). Cannabis is consumed via two routes of administration – smoking and eating. Smoking leaf and bud material is the most common route of administration, typically using either a dry pipe, cigarette (joint, blunt) or a water pipe (bong). Hashish and hashish oil are often added to leaf material when smoked (Australian Criminal Intelligence Commission, 2020). Of note, tobacco is also often added to smoked cannabis (Hindochoa et al., 2016). Using cannabis via e-cigarettes or vaporisers is increasing in popularity. Vaping cannabis can include both vaporising cannabis extracts or dried herb matter (Budney et al., 2015). There is a lack of research regarding recreational smoking of cannabis via e-cigarettes and its consequences (Budney et al., 2015; Chaiton et al., 2022). Thus, the majority of the review below does not specifically focus on vaping. Cannabis can also be ingested through foods (e.g. brownies, cookies) or beverages (e.g. tea, brew) containing cannabis (Swan et al., 2021).

THC is absorbed into the blood stream either via the lungs for smoked products or via the stomach for eaten cannabis, it then activates receptors in the brain to produce a 'high', commonly known as being 'stoned'. More specifically, THC produces a range of dose dependent effects on both neurocognitive and pharmacological systems and is a central nervous system depressant (Curran et al., 2016). THC acts directly with the endocannabinoid system (it is a partial agonist at cannabinoid type 1 receptors) and indirectly on the glutamatergic, GABAergic and dopaminergic systems (Bloomfield et al., 2019) with resultant effects on executive functioning, emotion, reward and memory processing. THC effects brain regions such as the hippocampus, amygdala, cerebellum, thalamus and basal ganglia (Bloomfield et al., 2019).

¹ Refers to substances controlled under the international drug control conventions, and their non-medical use, excluding alcohol and tobacco

The pleasurable effects associated with THC include euphoria, relaxation, sensory intensification (Bloomfield et al., 2019; Curran et al., 2016), increased sociability and spontaneous laughter and excitement (Australian Drug Foundation, 2021). Intoxication can result in the adverse effects of cognitive impairment (including memory), anxiety, paranoia, dry mouth, and occasionally psychotic-like symptoms (Curran et al., 2016; Green et al., 2003).

THC produces dose dependent effects, yet the THC content of cannabis products - its potency - varies greatly. THC concentration is lower in leaves than buds, and highest in resin (Lorenzetti et al., 2021). As noted by UNODC (UNODC, 2021) there has been a rapid advancement in the cultivation of cannabis over the last two decades which has resulted in an increase in potency of cannabis (Freeman et al., 2021; UNODC, 2021). The average concentration of flower products can exceed 20% and of concern, very high potency flower (60 – 80% THC) has been identified (Chan & Hall, 2020; Freeman et al., 2021). Considering this and the different ways people use cannabis in order to either maximise or moderate their THC consumption (Curran et al., 2016), the standardised assessment of cannabis use without biological measures is challenging.

The following paper will review the known effects of cannabis on health, mental health and psychosocial variables. It will then review the context of cannabis use in Australia more broadly before focusing specifically on the extent of use and related harms among Aboriginal and Torres Strait Islander Australians. The review will then present a summary of best practice in responding to cannabis related harms for Aboriginal and Torres Strait Islander Australians (herein the term Aboriginal will be respectfully used) and include a brief discussion of policy relating to cannabis use, before identifying areas for future research.

In reviewing the literature for the present paper, it is important to note the challenges in conducting research regarding the recreational use of cannabis. Firstly, as noted above, cannabis use is particularly challenging to quantify. This is due to a range of reasons including varying rates of THC concentration, varying modes of administration (Lorenzetti et al., 2021) and the impact of tobacco mixed with cannabis (Rooke et al., 2013). These factors all impact the validity and comparability of self-report data, from which the vast majority of cannabis research is based. Secondly, the focus of much research into cannabis has been limited, with the majority of literature assessing either lifetime, or, past year use of cannabis, thereby not assessing frequency, quantity, or pattern of use (e.g. high episodic use, low frequent use). Research which asks only about frequency of use is unable to account for quantity of use, which may be widely variable (Lorenzetti et al., 2021), and as such there is a dearth of research regarding heavy cannabis use, or that distinguishing heavy use from other patterns of use. This lack of specificity prevents more nuanced examination of the effects of differing cannabis use patterns. Furthermore, there has been disproportionate research on young adult and adolescent users who may yet have experienced long term effects (Rooke et al., 2013) thus limiting the capacity to fully understand long term risks of cannabis use. Thirdly, due to the illegal status of cannabis it is possible that willingness to disclose use may be impacted. Finally, with regards to research among Aboriginal communities the majority of detailed research has been conducted within remote communities, or with vulnerable populations such as people involved with the justice system consequently generalising the findings is problematic and many of the findings discussed cannot be considered representative of all Aboriginal people.

Known impacts of cannabis use

The toxicity of cannabis use is considered very low (Zahra et al., 2020) with a recent review of cannabis related deaths in Australia recording no known cases of cannabis toxicity leading to death. Despite this, and the challenges associated with research noted above, there are a number of acute and chronic cannabis related harms that are well established in the literature and have implications for mortality, wellbeing and for public health more broadly (Hall et al., 2019; Zahra et al., 2020).

Health

A number of reviews have identified a range of negative health effects associated with cannabis use (Campeny et al., 2020; Hall, 2009, 2014; Hall & Degenhardt, 2006; Hall et al., 2019; Zahra et al., 2020). These include effects on the respiratory system, cardiovascular system, cognitive function, psychomotor impairment, risk of cancer, in-utero effects from maternal use and sleep.

Cannabis which is smoked has an adverse effects on the respiratory system; smoked cannabis can contain more tar and polycyclic aromatic hydrocarbons than smoked tobacco (Rooke et al., 2013). Acute cannabis smoking can cause coughing and throat irritation (Hall, 2015). Chronic cannabis smoking is linked to chronic bronchitis and there is growing evidence for cannabis-related impairment of respiratory function including wheezing, exercise-related shortness of breath, nocturnal waking with chest tightness, morning sputum, coughing, chest sounds and phlegm production (Agrawal et al., 2012; Campeny et al., 2020; Gracie & Hancox, 2021). Of note, the effects on the respiratory system occur independently of tobacco use but tobacco and cannabis use can have an additive effect (Rooke et al., 2013), including central airway resistance, lung hyperinflation and higher vital capacity (Gracie & Hancox, 2021). There is no convincing evidence that cannabis smoking leads to chronic obstructive pulmonary disorder (COPD) independently of tobacco use (Gracie & Hancox, 2021). Although not consistently demonstrated, there is a potential relationship between cannabis use and lung cancer (Campeny et al., 2020; Gracie & Hancox, 2021; Rooke et al., 2013).

Cannabis use can result in cardiovascular complications, including acute coronary syndrome, vasospasm and arrhythmias (Jouanjus et al., 2014), particularly among naïve users (Hall, 2015), and an increased risk of angina for those with heart disease (Hall, 2014). A review of global case reports and epidemiological studies has highlighted the need to acknowledge cannabis as a contributing cause of sudden unexpected death, especially of cardiac and cerebrovascular nature (Zahra et al., 2020).

A recent systematic review of systematic reviews by Campeny and colleagues (Campeny et al., 2020) concluded that there is sufficient evidence to support the assertion that cannabis has a negative impact on cognition that persists after intoxication and is present when controlling for baseline function. Memory, executive functioning and learning are all impacted by cannabis use (Campeny et al., 2020). Longitudinal research has identified that sustained cannabis use over several decades can produce substantial differences in cognitive performance that may not be wholly reversible which is strongest for those whose onset of use is in adolescence (Hall, 2009). Hall surmised that cannabis users have lower attention and memory than non-cannabis users (Hall, 2014).

Cannabis use can result in acute psychomotor impairment (Hall, 2009, 2014), in conjunction with cognitive impairment this can lead to an increase in risk for accidental injury and motor vehicle accidents (Leikin & Paloucek, 2007), indeed acute cannabis intoxication is associated with a two-fold increase in the risk of road traffic accidents (Asbridge et al., 2016; Els et al., 2019; Li et al., 2012).

Emerging evidence also suggests that cannabis use during pregnancy has an impact on maternal and child health. Research in this area is highly challenging due to multiple confounds including tobacco use, under-reporting of cannabis use and complex social determinants. That said, there is strong evidence that maternal cannabis use is linked to low birth weight (Campeny et al., 2020; Eiden et al., 2020; Hall, 2009, 2014; Sturrock et al., 2020). Some studies have demonstrated a correlation between maternal cannabis use and later behavioural problems and developmental delays in children (Day et al., 1994; Fried & Smith, 2001), however, Hall described the quality of studies and potential confounds related to maternal cannabis use and post-natal child behaviour and presentation as challenging (Hall, 2014). Finally there is some evidence that maternal cannabis use may be related to birth complications and increased risk of admission to infant neonatal intensive care units (Campeny et al., 2020).

The relationship between cannabis use and an increased risk of cancer is not clear cut. In summarising the literature Hall (Hall, 2014) concluded that although research has found that THC and other cannabinoids have not been identified as potential

carcinogens, cannabis smoke is carcinogenic. As a result, the focus of research has been on the potential involvement of cannabis smoking on cancers of the lung, mouth, tongue, oesophagus and bladder (Hall, 2014), a field challenged by the co-use of cannabis and tobacco. To date, there is no evidence that cannabis use increases the risk of head and neck cancers (Campeny et al., 2020). As mentioned above there is mixed evidence of a relationship between cannabis and lung cancer; Campeny (Campeny et al., 2020) concluded that cannabis smoking increases the risk of lung cancer somewhere between 8% and 410% after adjusting for confounding factors. The incredible risk range resulted from the heterogeneity of samples and study designs (Campeny et al., 2020). Systematic reviews have concluded that there is evidence to support a correlation between cannabis use and testicular cancer (non-seminoma-type testicular germ cell tumours) in males (Campeny et al., 2020) (Hall, 2014).

Finally, cannabis use can affect sleep functioning. Acute, recreational use of cannabis can result in non-restful sleep and may interrupt slow wave sleep (Gates et al., 2016).

Social and emotional wellbeing

Research has consistently demonstrated a relationship between cannabis use and mental ill-health (Campeny et al., 2020) (Hall, 2014), including, cannabis dependence, psychosis, depression, anger, acute anxiety and elevated risk of suicide. It is important to note that cannabis may be related to mental ill-health due to a variety of mechanisms, including increased vulnerability for cannabis-related psychiatric disorders, poorer prognosis for pre-existing psychiatric disorders, self-medication hypotheses and the possibility of cannabis-medication interactions (Hudson & Hudson, 2021).

Cannabis dependence

Cannabis dependence, referred to as Cannabis Use Disorder (CUD) within the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), is defined as a problematic pattern of cannabis use leading to clinically significant impairment or distress (Hasin et al., 2013). Diagnosis requires two of the following occurring within a 12-month period: tolerance, withdrawal, inability to control consumption, craving, recurrent use causing negative impacts in role obligations including home, school and work, continued use despite negative consequences, hazardous use of cannabis, continued use despite knowledge of harms, and that cannabis (or a closely related substance) is taken to relieve or avoid withdrawal symptoms (American Psychiatric Association, 2013; Teesson et al., 2002).

An estimated 10% of people who use cannabis become dependent (Hamilton, 2019), thus most users will not become dependent. While this percentage is markedly lower than other drugs such as nicotine and heroin, reviews have also noted that the risk of developing CUD is greater for those who commence use in adolescence, use cannabis daily or weekly, or use cannabis with tobacco (Campeny et al., 2020; Hall, 2014; Peters, Budney, & Carroll, 2012; Teesson et al., 2002). Indeed within a community sample in Australia, 54% of cannabis users who used at least five times in the past year met criteria for cannabis dependence (Teesson et al., 2002). More recently Lorenzetti and colleagues noted that increases in THC content are related to increasing rates of cannabis dependence (Lorenzetti et al., 2021).

In considering cannabis dependence it is important to note the impact of cannabis withdrawal for those who quit or attempt to quit cannabis, and its potential discomfort, harm and impact on motivation to quit (Budney et al., 2008). Cannabis withdrawal symptoms include: depressed mood, anger, aggression, headaches, sweating/heart racing, restlessness, shakiness, nausea, stomach pain, decreased appetite, decreased body weight and sleep problems (American Psychiatric Association, 2013). There is increasing recognition in the literature of increases in anger, aggression and violence as a component of cannabis withdrawal (Budney et al., 2003; Lee et al., 2015; Smith, 2013). The onset of withdrawal typically occurs between days 1–3, with peak effects between days 2–6, and most effects last 4–14 days (Budney et al., 2003). Of note those who use both cannabis and tobacco are more likely to report cannabis withdrawal syndrome symptoms (Peters et al., 2012).

Psychosis

Despite a complex relationship, review of the literature suggests that cannabis use is a risk for psychosis (delusions, hallucinations and disordered thinking) and the diagnosis of schizophrenia (Bloomfield et al., 2019; Campeny et al., 2020; Curran et al., 2016; Gage et al., 2016; Mattick & McLaren, 2006). Whilst a pre-existing vulnerability to psychosis is an important factor in the relationship between the two (McLaren et al., 2010), cannabis use has an impact on incidence and prevalence of psychotic experiences (Linscott & van Os, 2013). Importantly age at onset of psychosis among clinical samples is 2.7 years earlier for cannabis users compared to non-users (Large et al., 2011).

Pattern of cannabis use is an important consideration with use at a younger age and heavier use more likely to predict onset of psychosis (Campeny et al., 2020). More recently there has been a focus on the potency of cannabis and the relationship with psychosis. In summarising the literature Lorenzetti and colleagues (Lorenzetti et al., 2021) noted that long term use of high THC cannabis was related to an increased risk of psychotic disorders. Further high potency cannabis impacts the course of psychoses, with use following a first episode of psychosis related to an increased risk of relapse, shorter time to relapse, and high intensity of psychiatric care. At a population level higher potency cannabis is related to increases in first-episodes of psychosis (Lorenzetti et al., 2021).

Mood disorders

Cannabis use may represent a risk factor for depression, particularly among those who use cannabis heavily (Campeny et al., 2020) and it has been suggested that this relationship may be stronger among those who also use tobacco (Peters et al., 2012). Similarly, cannabis use is also a risk factor for the development of bipolar disorder (Campeny et al., 2020), with greater risk related to higher levels of use. While population level and cohort studies have found mixed results and are largely challenged by confounding factors, research in clinical samples consistently demonstrates higher levels of cannabis use than among non-clinical samples. Research has also suggested that cannabis use may worsen symptoms in those experiencing depression or bipolar disorder (Hall, 2014)(Smolkina et al., 2017)(Cutler et al., 2018; Lagerberg et al., 2016).

Anxiety and anxiety disorders

The acute effects of cannabis intoxication can include anxiety and paranoia. There is some suggestion that this may result in presentations to emergency departments and ambulance call outs (Kaar et al., 2015; Zahra et al., 2020). Hall (Hall et al., 2019) proposed that the increase in potency of THC may have increased the risk of high acute anxiety particularly for naive users. Cannabis use is considered a risk factor at the population level for the development of anxiety disorders (Campeny et al., 2020).

Suicide risk

Cannabis use has been linked to suicide in a number of studies, and cannabis is considered a risk factor for death by suicide (Campeny et al., 2020) and suicidal ideation (Carvalho et al., 2019). However, a clear causal pathway has not been established and the majority of research has not controlled for potential confounding variables related to suicide (e.g. depression and alcohol use) (Calabria et al., 2010). Weekly cannabis use has also been found to be independently associated with a five-fold increase in self-harm among females (Patton et al., 2005).

Psycho-social harms associated with cannabis use

Cannabis use has been linked to a number of social harms in the literature; indeed cannabis users appear to report lower overall health and life satisfaction compared to non-using peers (Agrawal et al., 2012). Numerous studies have demonstrated a relationship between regular cannabis use in adolescence and risks of leaving school early (Stiby et al., 2015). In addition it is related to the use of other illicit drugs, tobacco use, heavy alcohol use and not being in a relationship when followed up at age 30 years (Chan et al., 2021). These associations persist after controlling for plausible confounding

variables in longitudinal studies; however, as noted by Hall, there are potential shared causes or risk factors (Hall et al., 2019).

The relationship between cannabis use and other drug use is worthy of comment with cannabis use often being considered as a 'gateway' drug to further drug use (Hall & Lynskey, 2009), thus being a risk factor for other illicit drug use. Cannabis use is demonstrably higher among those who use other illicit drugs than those who do not in general population studies, and regular and early cannabis use predicts other drug use (Hall & Lynskey, 2009). Furthermore, considering that cannabis use is more strongly associated with other illicit drug use than either alcohol or tobacco use, Hall and Lynskey (Hall & Lynskey, 2009) argue that although the gateway pattern may be explained by the common characteristics of those who use cannabis and other drugs, young people who are the earliest and most frequent cannabis users, are the most likely to use other illicit drugs. Similarly, given the common practice of mixing tobacco in with cannabis, cannabis use provides an avenue for nicotine addiction (Hindocha et al., 2017; Rooke et al., 2013).

Summary of cannabis related harms

Cannabis then is associated with a range of harms, yet the research is complex and clear causal pathways have been difficult to identify. In drawing conclusions from a systematic review of systematic reviews Campeny and colleagues (Campeny et al., 2020) affirmed that cannabis use is a risk factor for motor vehicle collisions, suicidal ideation, anxiety, depression, lower educational attainment and respiratory outcomes. In addition they identified that cannabis use was associated with testicular cancer, impaired cognitive function, lung cancer and other drug use (Campeny et al., 2020). Results of this and other reviews emphasise the potential harms of cannabis on mental health, with the evidence that adolescent cannabis use has a relationship with psychosis and incidence of schizophrenia, increased risk of depression and bipolar, and can result in persistent anxiety symptoms (Campeny et al., 2020).

The potential for low risk use

Despite these concerns and the public health implications of cannabis related harms it is important to keep these harms in perspective. For example, in the Global Burden of Disease project, regular cannabis use was found to produce much less harm than regular alcohol and tobacco use (Degenhardt et al., 2013). In Australia cannabis makes a smaller contribution to disease burden than opioids despite the much lower prevalence of opiate use (Hall et al., 2019). There is a lack of knowledge about what level of use is non-problematic (Curran et al., 2016). A recent review proposed to develop lower risk use guidelines (Fischer et al., 2021), suggesting that delaying the use of cannabis until after adolescence, avoiding high potency cannabis, avoiding smoking based administration, and avoiding high frequency and high intensity use would minimise much of the potential harms associated with cannabis use. Further in determining the potential for low risk use they emphasised the need for particular caution among pregnant women, drivers, older adults and those with health comorbidities (Fischer et al., 2021).

The context for cannabis use among Aboriginal and Torres Strait Islander people in Australia

Australian context of cannabis use

Much like the rest of the globe, cannabis is the most used illicit drug in Australia. In 2021, the past year prevalence (having tried cannabis at least once in the last year) in Australia was approximately 12% of the adult population (UNODC, 2021). The National Drug Strategy Household Survey (NDSHS) conducted in 2019 estimated a lifetime prevalence (having ever used in one's life) of cannabis use in Australia for those aged 14 years and over of 36% and a past year prevalence of 12% (Australian Institute of Health and Welfare, 2020b). This was an increase from 2016 (35% and 10% respectively) which is noteworthy as cannabis use rates had remained stable for the previous decade (UNODC, 2021). Among respondents in the 2019 NDSHS who had used cannabis, 37% reported using cannabis at least weekly.

Further results from the NDSHS indicate that prevalence rates are highest among young adults than other age groups (past-year prevalence aged 20–29 years - 24%) and that use among older adults is increasing (past-year use of cannabis increased from 7.2% in 2016 to 9.2% in 2019 for 50-59 year olds, and, from 1.9% to 2.9% for 60 years and older) (UNODC, 2021); the latter suggesting an ageing cohort of cannabis users in Australia (Australian Institute of Health and Welfare, 2020b; UNODC, 2021). The NDSHS data identified males over the age of 14 years as using more recently and more frequently than females. They were more likely to have used cannabis in the past week (15% compared to 8.6%) (Australian Institute of Health and Welfare, 2021b) and to do so at a higher frequency (41% of cannabis using males use once a week or more, compared to 31% of female cannabis users) (Australian Institute of Health and Welfare, 2021b, Hall, 2009).

The data suggest that the majority of people who use cannabis in Australia do not do so at levels commensurate with high risk. The NDSHS included questions in 2019 aimed at identifying high risk use, they identified that 82% of cannabis users were low risk (Australian Institute of Health and Welfare, 2020b). Consistent with this, examination of data between 2007 and 2016 found that only one in six cannabis users were daily users, and daily users accounted for more than 80% of the estimated cannabis consumed in Australia (Chan & Hall, 2020). The NDSHS data demonstrate a relationship between cannabis and mental health at the population level, where those who reported mental health conditions were more likely to consume cannabis than those who did not (Australian Institute of Health and Welfare, 2020b, 2021b). Other characteristics of cannabis use in Australia drawn from a range of government sources and summarised by the AIHW include higher rates of use in rural areas compared to urban areas (as measured via wastewater), high rates of cannabis use among prison entrants, and high rates of cannabis use among those who use other illicit drugs (Australian Institute of Health and Welfare, 2021b).

Considering the heightened harms associated with using cannabis from adolescence, data from the Australian Secondary School Alcohol and Drug Survey (ASSAD) provide important information. In the most recent ASSAD conducted in 2017, 17% of secondary students who participated had used cannabis in the past year, and 8% had used in the past month. This was an increase since a previous survey in 2011 (15% and 7% respectively) (Guerin, 2018). Importantly, cigarette smoking has been identified as a significant predictor of both initiation and persistence of cannabis use during the later school years (Coffey et al., 2000).

There is limited evidence as to the degree to which cannabis related harms are present in the Australian community, however examination of the social costs of cannabis estimated that cannabis costs Australia 4.5 billion dollars per annum, with the primary costs related to law enforcement and crime. Also included in this are estimates of approximately 152,000 people dependent on cannabis and 3,422 cannabis attributable adult prison sentences (Whetton et al., 2020). Interestingly, evidence of a potential increase in cannabis use and related harms comes from data trends suggesting ambulance call outs related to cannabis use are increasing (Kaar et al., 2015). The National Minimum Dataset for Alcohol and other Drug Treatment Services (AODTS NMD) collects data from drug treatment services as part of the National Drug Strategy (NDS) (Australian Institute of Health and Welfare, 2021a) and highlights that cannabis use places a burden on the AOD treatment sector. Data suggests that cannabis use is the primary drug of concern in 18% of closed treatment episodes (including education, counselling, case management, residential rehabilitation, and detoxification) for people entering AOD treatment (Australian Institute of Health and Welfare, 2021a). Furthermore, over the past decade, treatment episodes for cannabis use have increased by 27% (rising from 31,700 to 40,300 episodes). Among young people (aged 10 – 19 years) cannabis was the primary drug of concern for 59% of treatment seekers (Australian Institute of Health and Welfare, 2021a), highlighting the high level of treatment need for cannabis among young people.

A final point regarding cannabis use in Australia was the finding in the 2019 NDSHS that attitudes regarding cannabis use became more favourable since 2016 (Australian Institute of Health and Welfare, 2020b). This is consistent with concerns raised by the

UNODC who highlighted that cannabis is currently increasing in potency yet social acceptability and perceptions of harm associated with cannabis use are decreasing (UNODC, 2021).

Historical, social and cultural factors related to cannabis use among Aboriginal and Torres Strait Islander people

Before turning to address the use of cannabis by Aboriginal people it is important to acknowledge the socio-cultural context within which cannabis use occurs. As a result of both historic and enduring colonisation, dispossession of land, language and culture, child removal and entrenched systemic racism, Aboriginal people have greater exposure to social disadvantage including life stressors, traumatic events and lack of adequate service provision which are all factors associated with alcohol and other drug (AOD) use and challenges to social and emotional health (Dudgeon et al., 2014a). This social disadvantage occurs against a backdrop of overt and covert racism against Aboriginal people which still exists, and operates at a cultural, institutional, and individual level (Dudgeon et al., 2014a; Paradies, 2005; Priest et al., 2013). AOD use, including cannabis use, can then also become a risk factor for further marginalisation and ill-health. Indeed, cannabis use can occur within a context of chronic health and mental health conditions. These factors are important to consider not only in understanding prevalence and patterns of cannabis use among Aboriginal people, but also in reviewing research undertaken, and developing appropriate prevention and intervention approaches. Furthermore, these challenges which face Aboriginal communities impact on the available human and financial resources that can be allocated to reducing cannabis use.

Extent of cannabis use among Aboriginal and Torres Strait Islander people in Australia

Cannabis use rates (including by sex, age) current and recent trends

Despite the fact that cannabis is the most commonly used illicit drug globally, in Australia there is scant epidemiological data regarding cannabis use and related harms among Aboriginal people. The majority of research to date is limited to prevalence data collected from large national surveys. The data presented below are drawn from the 2018-2019 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS), the Aboriginal cohort within the NDSHS and the ASSAD. It is important to acknowledge that these national level surveys tend to underestimate actual consumption (Gray & Wilkes, 2010a; Stockwell et al., 2004); furthermore, adequate sampling from remote areas is not always possible, therefore findings must be interpreted with caution.

Data from the 2018-2019 NATSIHS identified that 25% of participants (over 15 years) used cannabis within the previous month. Use was higher among males (31%) than females (18%) (Australian Bureau of Statistics, 2019). There was an increase in past year prevalence from 2008 to 2018–19, from 14% to 25% in remote areas and from 18% to 24% in non-remote areas (although reliability of remote area data is limited) (Australian Bureau of Statistics, 2019; Australian Institute of Health and Welfare, 2021b).

The data consistently show higher prevalence and higher levels of consumption of cannabis among Aboriginal people compared to non-Aboriginal people (Australian Bureau of Statistics, 2004, 2008, 2010, 2019). Data published by the Australian Bureau of Statistics and the Australian Institute of Health and Welfare estimate previous 12-month prevalence of cannabis use among Aboriginal respondents as 16% (a smaller prevalence than that identified in the NATSIHS). Whereas the estimate for the general Australian population is 12%, suggesting Aboriginal people are 1.3 times more likely to have used cannabis (Australian Bureau of Statistics, 2019). These comparisons must be considered in the socio-historical context in which Aboriginal people use cannabis, and are presented to illustrate the potential for cannabis use to contribute to the health gap experienced by Aboriginal people and not to contribute to a deficit based discourse (Colonna et al., 2020; Fogerty et al., 2018).

Young people are a population of considerable interest and results from a number of studies suggest high rates of use. The ASSAD found that the majority of secondary students who identified as Aboriginal had used cannabis in the past month (58%), and had a higher likelihood (adjusted odds ratio 1.97) of ever having used cannabis than non-Indigenous students (Heris et al., 2020). Similarly, a study of secondary school children in NSW reported that Aboriginal students were more likely to use cannabis than non-Aboriginal students, and were more likely to initiate use earlier and use more frequently (Forero et al., 1999). In contrast to these findings, data among 15 - 29-year-old participants in the NATSISS reveal that the majority of young people have never tried cannabis (71%) (Australian Bureau of Statistics, 2019; Graham 2018).

Data from The Goanna Study - a cross-sectional survey of just under 3000 Aboriginal young people aged 16–29 years which focused on sexual health and relationship - asked a number of questions about drug use (Ward et al., 2014). They found that just over 35% had used an illicit substance in the last year; cannabis was the most frequently used drug with 30% of respondents having used it in the last year. Among those who used cannabis 37% used daily and 24% weekly or more, suggesting the majority of those who did use cannabis did so regularly (Ward et al., 2014). Taken together the data suggest that cannabis use is prevalent among young Aboriginal people and that rates of frequent use are concerning.

The exception to the broad prevalence data described above is the work by Clough and colleagues (Clough, 2005; Clough, D'Abbs et al., 2004; Clough, Cairney et al., 2004; Clough et al., 2005; Clough et al., 2002; Clough et al., 2006; Lee et al., 2007; Lee et al., 2008; Lee et al., 2009; Lee et al., 2009) whose work in Arnhem Land documented a rapid rise in cannabis use in the late 1990s and early 2000s. The research, although now somewhat dated, described the characteristics and impacts of cannabis use in a number of small communities; their research revealed very high prevalence of cannabis use. In one study they reported a lifetime prevalence of cannabis use of 77% for males and 61% for females in a sample of 190 people (aged 17–36 years) from three remote communities in Arnhem Land (Clough, 2005). Among those who did use cannabis, 24% did so weekly or more frequently. In a separate study (Clough, D'Abbs, et al., 2004) estimated past week rates of cannabis use were as high as 73% in males and 27% in females across three small communities.

More recently, Clough and colleagues have undertaken work in remote Cape York communities in Northern Queensland (Bohanna & Clough, 2012; Graham & Clough, 2018). They identified very high rates of cannabis use, with 66% of males and 31% of females interviewed from a single community being current users in one study, and 55% of males and 30% of females in another study which collected data from three communities (Graham & Clough, 2018). Furthermore, in the initial study only 22% of males and 39% of females had never used cannabis (Bohanna & Clough, 2012). The research conducted in Northern Australia is both community and time specific and consequently not generalisable. However, the data do demonstrate the extent and high prevalence of cannabis use which can occur in some communities. Considering this data, a number of commentators have argued that cannabis use is endemic in remote Northern Australian communities and of significant cause for concern (Bohanna & Clough, 2012; Graham 2018; Lee et al., 2009) (Robertson & Dowie, 2008).

Despite the lack of detailed research focused on cannabis outside of remote communities in Northern Australia, research among vulnerable populations has identified high levels of cannabis use and are worthy of discussion. A number of studies have highlighted the high rates of cannabis use among those involved with the criminal justice system. In examining drug use among incarcerated males, Doyle and colleagues identified that Aboriginal prisoners were more likely to have used cannabis at least daily prior to incarceration (46%) compared to non-Aboriginal prisoners (37%) (Doyle et al., 2015). Similarly Heffernan and colleagues identified that among a sample of 419 Aboriginal prisoners in Queensland, cannabis dependence was noted in 26% of females and 20% of males (Heffernan et al., 2016). Further, Steele and others found that among justice involved young people (aged 14 – 17 years), that 79% of young people had ever used cannabis and 70% had used in the previous year (Steele et al., 2021). High levels of cannabis use have also been noted among police detainees as part of the Drug Use

Monitoring in Australia (DUMA) program; the two most common drugs detected for Aboriginal detainees were cannabis (ranging from 52% in Sydney to 72% in Perth) and methamphetamine (ranging from 28% in Adelaide to 65% in Perth) (Australian Institute of Health and Welfare, 2020a).

Considering the potential for cannabis to cause harm for unborn children, the use of cannabis, and high levels of cannabis and tobacco co-use, pregnant women are a population worthy of consideration. Brown and others (Brown et al., 2019; Brown et al., 2016) found that 21% of pregnant women in a birth study of 344 mothers of Aboriginal babies had used cannabis during pregnancy. The study found that maternal cannabis use was related to low birth weight and preterm birth when controlling for other variables (Brown et al., 2016). The adjusted mean difference (controlled for health and wellbeing variables) and in birth weight between mothers who used cannabis and those who smoked neither cannabis nor tobacco was 419g (Brown et al., 2016). Similarly, in a cross-sectional sample of 257 pregnant Aboriginal women Passey and colleagues identified that 15% of participants smoked cannabis. They noted the co-occurrence of alcohol, tobacco and cannabis use (Passey et al., 2014), and although almost half of the participants did not smoke cannabis, drink alcohol nor smoke tobacco during pregnancy, there was a high risk cohort that used all three (Passey et al., 2014).

Finally, the perceptions of health workers on the rates of cannabis use provide useful information. As part of a project to pilot cannabis screening and brief intervention, staff of six Aboriginal Community Controlled Health Services were asked about their perceptions of cannabis in the local community – 95% of participants reported use was ‘common’ or ‘very common’ (Butt et al., 2009). Thirty percent reported ‘most’ of their patients used cannabis, with only 50% reporting either ‘a quarter’ or ‘a few’. The theme that cannabis use was normalised was consistent in focus groups with health care staff (Butt et al., 2009).

Despite the difficulty in identifying high quality epidemiological data related to cannabis use, it is clear from the existing research that cannabis use is concerning high among Aboriginal people. Indeed, researchers and community consultations from Northern Australia and Aboriginal health staff in both urban and rural communities have raised concerns about the high prevalence and normalisation of cannabis use. Despite these high rates and some concern regarding public health implications of high rates of use, cannabis use has attracted little concern among the health community. In summary, while cannabis has rarely been the focus of research it has been identified in a number of studies in which it becomes part of a broader cluster of concerns which arise from inequality and contribute to ill-health and decreased social and emotional wellbeing.

Patterns of cannabis use and social contexts of cannabis use

Course of cannabis use

Considering that the international data regarding the harms associated with cannabis being exacerbated when use commences at a young age (Passey et al., 2014), it is important to understand the age of initiation and the context of use in order to develop successful prevention and health promotion strategies. Detailed qualitative and descriptive data regarding both cannabis initiation and the lifetime course of cannabis use is lacking which prevents a nuanced discussion. What we do know from research to date is that cannabis initiation is common in adolescence. As described above, research data from ASSAD demonstrates that cannabis use initiation starts in school for some young Aboriginal people; 19% of Aboriginal students aged 12-15 years reported they had used cannabis, and 42% of 16-17 years olds reported cannabis use (Heris et al., 2020). Similarly, Clough identified that cannabis use commences at a young age in some remote Aboriginal communities in the NT (Clough, 2005; Clough et al., 2005). In Bohanna and Clough's community sample in Northern Queensland, the mean age of cannabis initiation was 15.7 years, and community consultation in North Queensland identified that communities are becoming concerned at the young age at which people are starting to use cannabis (Robertson & Dowie, 2008). These findings are in contrast to that of a sample of vulnerable young people – those involved with the justice system – who had a mean age of cannabis initiation of 13 years with a range 5 years to 17 years (Steele et

al., 2021). Considering the higher risk of harms associated with cannabis use at a young age these findings are concerning. The latency between age of initiation and onset of regular use, and the factors predicting transition to regular use are lacking in the literature.

Understanding the course of cannabis use, in particular patterns of cessation across the lifespan, is significant in the development of interventions which prevent harms associated with cannabis use. International literature has identified that progression from cannabis use to dependence is related to frequency and quantity of use, tobacco use, alcohol use and peer use (Cerdeira et al., 2018; Chan et al., 2021; Copeland & Pokorski, 2016; Copeland et al., 2017; Degenhardt et al., 2001; Hall, 2014; Taylor et al., 2002). Very limited research regarding the course of cannabis use has been undertaken with Aboriginal people. Only one longitudinal study has been published to date. Lee and others conducted a five-year longitudinal study with 83 people from three remote Arnhem Land communities, they found that 76% of male and 54% of female cannabis users at baseline were still using cannabis at follow-up (Lee et al., 2009). The only significant predictors of cannabis use at follow-up were being male and a history of petrol sniffing. Lee's findings suggested that within this specific cohort cannabis use was persistent with dependence symptoms commonplace (Lee et al., 2009).

Several studies have investigated cannabis cessation among Aboriginal adults. Jacups and others (Jacups & Rogerson, 2015) investigated predictors of cannabis cessation among incarcerated Aboriginal males from non-urban communities of origin. Not surprisingly, non-voluntary cessation on incarceration was the primary reason identified by participants, other influences included social reasons (having a new child, family responsibilities and changes in peers), health and wellbeing (in particular paranoia) and employment reasons. They also examined self-reported factors which increased cannabis use and these included stress (including relief of physical pain and emotional pain), social influences (peers and family influence) and boredom (Jacups & Rogerson, 2015). The research in Cape York has discussed cannabis cessation among Aboriginal people; Bohanna and Clough reported that among community respondents 31% of females and 12% of males were former cannabis users, suggesting successful discontinuation of cannabis use, furthermore, a significant proportion of current users (76%) reported a desire to quit (Bohanna & Clough, 2012). Key reasons for quitting cannabis or wanting to quit cannabis were consistent with the findings of Jacups and included: family, mental health, no longer being interested, financial concerns and starting a new job (Bohanna & Clough, 2012). There is limited data from which to explore the course of cannabis use, particularly among Aboriginal people living in urban areas. Existing results do suggest that cannabis cessation can be linked to social factors which are consistent with the international literature.

Patterns and social contexts of cannabis use

As above there is limited detailed descriptive or qualitative data regarding patterns and social contexts of cannabis use among Aboriginal Australians, and much of the existing data is not generalisable. Understanding patterns of cannabis use requires an understanding of quantity and frequency of use; there has not been a uniform approach to this in the research, and most studies are limited to lifetime and past year severity. Lifetime or past year use of cannabis does not indicate cannabis use that may result in harm. Some data exists in which patterns of cannabis use are reported and tend to reveal heavy prevalence use among those who use cannabis. In studies conducted in Northern Australia, 48% of current cannabis users were identified as being heavy users (defined as using more than 6 cones per session at least weekly; in the larger Cape York study across three communities), (Graham 2018), similarly Lee and colleagues found 49% of participants in three Arnhem communities (aged 13- 42 years) reported smoking more than six cones per day (Kylie Lee et al., 2008). High rates of harmful use have been identified in other studies. For example Passey noted that among pregnant Aboriginal women currently smoking, the mean quantity of cannabis consumed per occasion was seven cones or joints per day (Passey et al., 2014). Among incarcerated males from non-remote areas, an average daily consumption of 12.3 cones per day was reported (Jacups

& Rogerson, 2015), and over 30% of justice-involved young people reported using cannabis more than once per day (Steele et al., 2021).

Lee and colleagues reflected that the rates of heavy use noted in Arnhem Land were consistent with observations from alcohol research which suggests a polarisation of users, with most Aboriginal people being heavy users or abstainers (Lee et al., 2009). Focus group discussions with Aboriginal health workforce health workers have reported anecdotal evidence that heavy episodic cannabis use (inconsistent 'binge' use) was common among young people (Butt et al., 2009). Thus, the limited data available emphasises that risky patterns of cannabis consumption exist among Aboriginal cannabis users, particularly among vulnerable populations. Further research is required to determine a clearer picture of differing patterns of cannabis use.

There has been little discussion regarding cannabis use behaviour in the literature, however research suggests that the most common mode of cannabis use is smoking and the use of bongs is the preferred smoking method (Clough, D'Abbs, et al., 2004; Graham 2018). Social contexts, such as typical situations and locations for cannabis use, and the makeup of social situations in which cannabis is used (e.g. intergenerational, peer, family, mixed gender) have not been adequately described in the literature and in depth qualitative research into the social context of cannabis use is indicated.

Polydrug use

Cannabis is often used alongside other drugs either on the same occasion or by the same person on different occasions. As commented by a participant in health worker focus groups, '*cannabis is the other drug in polydrug use*' (Butt et al., 2009). The clustering of alcohol, tobacco and cannabis consumption are widely documented in the international literature and among Aboriginal people (Brown et al., 2016; Heris et al., 2020). Clough and colleagues reported that current users of cannabis were more likely to be heavy alcohol drinkers and tobacco smokers than non-users (Clough, D'Abbs, et al., 2004; Clough et al., 2005). Interestingly, an analysis of the ASSAD data shows that Aboriginal school students who smoked tobacco were more likely to also smoke cannabis, however were not more likely to use alcohol (Heris et al., 2020).

The relationship between cannabis and tobacco is of particular concern with high global rates of co-use (Hindocha et al., 2016). Consistent with the international literature, Aboriginal people who use cannabis mostly smoke cannabis mixed with tobacco and are more likely to smoke tobacco cigarettes in greater numbers than those who do not use cannabis (Thomas et al., 2018). A recent study investigating the co-use of cannabis and tobacco among Aboriginal adults who identify as smokers found that 81% of cannabis smokers also smoked tobacco (Butt, 2020). Co-use of tobacco with cannabis is the norm rather than the exception (Butt, 2020; Thomas et al., 2018) and presents significant health effects, including increasing the risk of dependence on both substances (Patton et al., 2005; Ramo et al., 2012; Tucker, 2019).

Consistent with the 'gateway' phenomenon, cannabis is potentially a risk factor for other illicit drug use (Hall & Lynskey, 2009), and indeed cannabis use has been shown to be high in the general Australian community (Australian Institute of Health and Welfare, 2021b) and among Aboriginal illicit drug users (Passey et al., 2014). For example, in a large national survey on methamphetamine use among Aboriginal and non-Indigenous people, 57% of the Aboriginal participants who used methamphetamine also used cannabis in the previous month (Reilly et al., 2020). Important to note is that within this study there was no difference in cannabis use prevalence between Aboriginal and non-Indigenous participants who used methamphetamine (Reilly et al., 2020).

Risk and protective factors

A small number of studies to date have identified risk and protective factors in relation to cannabis use. In a recent strengths based study Graham and colleagues (Graham et al., 2021) investigated the factors associated with never having used cannabis in a sample of 301 (64% female) Aboriginal young people (aged 16-24 years) drawn from a larger study; 58% of the sample had never used cannabis. They found that never having used

cannabis was associated with other positive health and wellbeing indicators such as never having drunk alcohol, never smoking cigarettes, never being diagnosed with anxiety, having low levels of psychological distress and being a parent or caring for a child (Graham et al., 2021). In another study among male non-urban incarcerated Aboriginal males current cannabis users were more likely to have left school earlier and been involved with the justice system as a juvenile than those who had never used cannabis or were ex-cannabis users (Jacups & Rogerson, 2015). Taken together these results emphasise that cannabis use is part of a broader pattern of health and wellbeing.

A number of studies have investigated the risk and protective factors associated with drug use among Aboriginal people. A recent systematic review of the literature (Snijder et al., 2020) has identified individual-level, relationship-level, community level, societal level, and culturally distinct factors which were then used to develop an ecological model of drug and alcohol use and related harms. Individual level factors included low socio-economic status, high psychological distress, polydrug use and being male. Relationship level risk factors were peer pressure, family or partner drug use, with protective factors being supportive environments and availability of positive role models. The community level risk factor was availability of drug use. Culturally distinct factors included cultural connection as a protective factor but cultural obligation around sharing as a risk factor (Snijder et al., 2020). The authors identified intergenerational trauma resulting from government policies as a societal risk factor for AOD use. This review demonstrates the importance of considering cannabis, and other drug use, within broader ecological contexts (Snijder et al., 2020).

Extent of cannabis related harms

There is a considerable lack of literature detailing the degree to which cannabis related harms are experienced in the Aboriginal community, however the lack of research attention does not equate to lack of harms. As concluded in the *Little children are sacred: report of the Northern Territory Board of Inquiry into the protection of Aboriginal children from sexual abuse*:

Cannabis has been a significant issue identified at nearly every community meeting it has held. Participants in these meetings identified that cannabis is present in their community and they believe it is having negative effects on community and family life and, in particular, consequential effects on the care and protection of children (Anderson & Wild, 2007, pp. 173).

Similarly, research within Aboriginal community controlled primary health care identified that health staff regard cannabis use as causing considerable harm (Butt et al., 2014). The prevalence data presented above notes patterns of use which are consistent with the likelihood of experiencing harms – use at a young age and high levels of use – thus it is likely that harms are experienced by Aboriginal people who use cannabis. Specific individual level harms have been noted in the literature pertaining to communities in Northern Australia these include high rates of dependence (Graham, 2018), mental health concerns including anger and irritability, thoughts of suicide/self-harm, paranoia, depression, memory problems (Bohanna & Clough, 2012), and increased risk of violence (Lee et al., 2015). Further anecdotal evidence from community members has expressed concern that cannabis use may be a trigger for relationship problems, family violence, suicide, and psychosis (Anderson & Wild, 2007; Lee et al., 2007; Putt & Delahunty, 2006).

In addition to the direct effects of cannabis, it is likely that cannabis plays a role in exacerbating and maintaining existing health and wellbeing problems at a community level. Several papers have reported concerns that Indigenous community members have about the broader effects of cannabis (Clough, D'Abbs, et al., 2004; K. Lee et al., 2007; Putt & Delahunty, 2006)(Clough et al., 2006; Robertson & Dowie, 2008), these include: the high proportion of income spent on cannabis, community violence related to supply in remote communities, the impact of big dealers on community, child neglect, sexual exploitation, declining participation in community life, and reduced participation in education and training. Community level concerns such as high rates of cash spent on cannabis and normalised use have also been noted (Clough, Cairney, et al., 2004;

Clough, Cairney, et al., 2002; Clough, D'Abbs, et al., 2004; Clough et al., 2005; Clough et al., 2006; Graham, 2018). For example, in research conducted in three northern Queensland communities researchers identified that across three communities up to \$AUD14,200/week was spent on cannabis, which equated to 9% of community members' total income (Graham, 2018). Withdrawal from education (Steele et al., 2021) and engagement in the criminal justice system (Clough et al., 2006) have also been noted as harms associated with use.

There is a lack of research documenting the prevalence of harms associated with cannabis use; however, some studies have shown some clear harms to health and wellbeing. Jacups used the Marijuana Problems Inventory among their sample of 101 non-urban incarcerated Aboriginal males (Jacups & Rogerson, 2015). They identified that among cannabis users 51% identified experiences of anxiety and paranoia, 52% identified forgetting to care about themselves (not eating right, not participating in family activities etc.), 30% feeling down or sad with no good reason, 48% reported not engaging in valued activities because of using cannabis and 61% reported getting trouble with police in relation to use (Jacups & Rogerson, 2015). It is relevant to note that 74% of participants reported smoking cannabis first thing in the morning before breakfast – a practice consistent with dependence (Jacups & Rogerson, 2015).

Cannabis dependence has been noted in a number of additional studies suggesting that the extent of harms related to dependence is significant. In a sample of Aboriginal people in custody, Heffernan identified that 95% of those using cannabis met criteria for cannabis dependence (Heffernan et al., 2016). Similarly, in Cape York, Bohanna and Clough identified 68% of participants who used cannabis at least weekly met criteria of dependence using the severity of dependence scale (Bohanna & Clough, 2012). Among the longitudinal sample followed by Lee and others they found that 88% percent of cannabis users reported three or more symptoms of dependence; most commonly experienced were unsuccessful attempts to control use, withdrawal symptoms and time spent obtaining cannabis or recovering from its effects (Lee et al., 2009). Findings from these studies, although not generalisable, indicate that concerning high rates of cannabis use dependence can exist in some Aboriginal communities and at-risk cohorts.

The presentation to treatment for cannabis related harm can also provide some indication of the extent of harms experienced by Aboriginal people. Among people seeking treatment for AOD use, cannabis use is high, indeed the Alcohol and Other Drugs Minimum Data Set (AODT MDS) 2018-2019 highlights that Aboriginal people are more likely to receive drug treatment for cannabis use than non-Indigenous people (Australian Institute of Health and Welfare, 2021a). Further findings from the AODT MDS suggest that almost one in five clients seeking treatment for own use of cannabis were Aboriginal (Australian Institute of Health and Welfare, 2021a). Trends in the AODT MDS also suggest that there are increasing numbers of treatment episodes for cannabis use for Aboriginal people; increasing from 4,397 closed episodes in 2010/11 to 7,775 in 2019/20 (Australian Institute of Health and Welfare, 2021a). To put this data in to context a file audit of 2,326 admissions to an Aboriginal Community Controlled Rehabilitation facility identified cannabis as the primary drug of concern for 12% of patients (James et al., 2022), suggesting that despite high prevalence of use, and potentially high rates of cannabis dependence, it is a primary drug of concern for only a small proportion of those seeking treatment. This gap between rates of dependence and prevalence and treatment seeking warrants further research to identify why people who use cannabis may not be accessing treatment services.

Cannabis use is a risk factor for the development of mental health disorders and potentially suicide (Campeny et al., 2020; Measey et al., 2006). The extent of mental health harms as a result of cannabis use among Aboriginal people is not possible to quantify due to the lack of longitudinal research which can adequately account for confounding variables. That said, high rates of comorbidity of cannabis use and mental health disorders have been noted in the literature. Those who use cannabis are more likely to experience depression (Jacups & Rogerson, 2015; Jamieson et al., 2011; Lee et al., 2008), anxiety (Bohanna & Clough, 2012; Jacups & Rogerson, 2015) and psychosis (Clough et al., 2006). Of note in the study by Lee, individuals who used cannabis heavily (six or more cones per day) were four times more likely to report moderate to severe

depressive symptoms (after adjustment for age, sex and other substance use) (Lee et al., 2008). At a community level Clough found that mental health presentations increased as cannabis use increased in a number of small communities in Arnhem Land (Clough, D'Abbs, et al., 2004; Clough et al., 2005). Mental health sector data also reveals important insights. In a data linkage study examining treated cases of psychosis in Cape York, cannabis use was associated with 60-70% of psychosis cases in the Aboriginal population from 2003 to 2015 (Gynther et al., 2019).

The Western Australian Aboriginal Child Health Survey (WAACHS), which is a large scale research project into the health of Aboriginal children in Western Australia, collected social and emotional wellbeing data from 3,993 children aged 4 to 17 years. Cannabis use was included in the research (Zubrick et al., 2005). The results demonstrate the intersection of cannabis use with overall social and emotional wellbeing. Daily cannabis use was associated with risk of clinically significant emotional or behavioural difficulties. Over one quarter (29%) of young people who used cannabis daily were at risk of clinically significant emotional or behavioural difficulties compared with 8.7% of young people who had never used cannabis, this finding was stronger among females. The proportion of young females at high risk of significant emotional or behavioural difficulties increased with increasing frequency of cannabis use (Zubrick et al., 2005).

Finally, evidence of the extent of cannabis related mental health harms can be drawn from emergency department data which has previously identified that Aboriginal people are five times more likely to be hospitalised for cannabis-related mental and behavioural disorders than non-Indigenous people (Australian Institute of Health and Welfare, 2011) although more recent data is required. In considering AOD use disorders and mental health comorbidities more generally, Aboriginal people who experience comorbid disorders are likely to have poorer outcomes than those experiencing a mental health or AOD use disorder alone (Wilkes et al., 2010). Comorbidity can lead to severe and wide ranging negative outcomes, including poor health, diminished social networks, unemployment, and financial instability; and impacts on capacity to care for self and dependents (Lee et al., 2013).

In light of international evidence that cannabis use is associated with an increased risk of suicide (Campeny et al., 2020; Measey et al., 2006) and concerning suicide rates among Aboriginal people (Measey et al., 2006; Soole et al., 2014), it is important to consider the potential role of cannabis use in suicide and suicidal ideation among Aboriginal people (Measey et al., 2006). Increased suicide risk has been noted among individuals with an AOD use history; for example Aboriginal people in custody with an AOD use disorder are more likely to have experienced suicidal thoughts and ideation than those who do not use substances (Heffernan et al., 2016). With respect to cannabis use specifically, for participants in remote Arnhem communities participating in the research by Clough and colleagues, those using cannabis at baseline and follow-up in a three year study were more likely to report suicidal ideation (Clough et al., 2006). Similarly, in the WAACHS, suicidal ideation in the 12 months prior to the survey was significantly lower in young people who had never used cannabis (12%) compared to those who had used in the last year. The proportion having suicidal thoughts within the last year was 25%, 32% and 29% of those using marijuana 'less than monthly', 'about weekly' and 'daily' respectively (Zubrick et al., 2005).

Various reviews of deaths by suicide have identified cannabis in post-mortem toxicology and coronial inquest suggest an association between cannabis use and suicide. In the coronial inquest into the deaths of 13 young people by suicide in the Kimberly in Western Australia, the Coroner noted that three cases had cannabis derivatives in their blood after death (Fogliani, 2019), with recommendations from the inquest noting the need for increased AOD treatment services. In a review of suicide deaths in Western Australia in 2000 it was noted that 20% of males and 11% of females recorded positive toxicology for cannabis; there was no significant difference between Aboriginal and non-Indigenous people (Hillman et al., 2000). Finally in other reviews of suicide deaths, in the Northern Territory cannabis was formally detected in 31% of Indigenous and 20% of non-Indigenous cases, and noted in a further 17% and 11% of case reports, respectively (Kuipers et al., 2012). Cannabis was identified as having a role

in the suicide of 30% of young Aboriginal suicide cases and 20% of older adult suicides using thematic analysis of cases (Hanssens, 2007). A number of authors have concluded that much like alcohol, high cannabis use is associated with increased suicidal ideation in Aboriginal communities (Kuipers et al., 2012) (Clough et al., 2006).

Considering the legal status of cannabis in Australia engagement in the justice system is a potential harm of recreational use. Arrests for personal cannabis use can result in wide-ranging and long-lasting impacts on an individual, their family and community. Despite this, there is scant publicly available data from which to examine engagement in the justice system arising from cannabis use among Aboriginal people and its impacts. The latest national population-based arrest data reported by the Australian Crime Commission demonstrate that the majority of arrests are for personal recreational use. There were 71,151 cannabis arrests in 2018-2019; 91% were due to personal possession or use, with supply-type offences such as importation, trafficking, selling, cultivation and manufacture making up only 9% (Australian Criminal Intelligence Commission, 2020).

Not surprisingly, there is concern that the legal status of cannabis may put Aboriginal people at risk of engagement with the justice system. As highlighted by the Victorian Aboriginal Legal Service Submission to the Victorian Inquiry into Use of Cannabis in Victoria in 2020 – incarceration as a result of personal cannabis use contributes to continued overrepresentation of vulnerable communities in the justice system (Victorian Aboriginal Legal Service, 2020). These concerns are well founded considering data revealed by The Guardian Newspaper which highlighted that in NSW in 2019 Aboriginal people were more likely to be pursued in court for cannabis related offences than non-Indigenous people. The Guardian reported:

82.55% of all Indigenous people found with a non-indictable quantity of cannabis were pursued through the courts, compared with only 52.29% of non-Indigenous people, and non-Indigenous people were four times more likely to receive a caution (McGowen & Knaus, 2020).

This data suggests that Aboriginal people who use cannabis are at a greater risk of incarceration than non-Aboriginal people and raises concerns regarding the unequal application of cannabis related laws. Increased rates of incarceration place Aboriginal people who use cannabis at risk of experiencing the range of negative consequences associated with incarceration – including challenges in finding employment and housing post release, stigma, and the negative mental health effects of incarceration (e.g. Wilson et al., 2017). Given the apparent unequal application of cannabis laws and the experience of overpolicing described by Aboriginal people (e.g. Wilson et al., 2017) further examination of the impact of cannabis related policing and engagement in the justice system for Aboriginal people is warranted.

Prevention and treatment for cannabis related harms

Unsurprisingly, given the lack of overall research into cannabis use among Aboriginal people there is a lack of evidence regarding effective responses to harmful cannabis use among Aboriginal people. As stated in the *Little children are sacred: report of the Northern Territory Board of Inquiry into the protection of Aboriginal children from sexual abuse*:

Literature on how best to respond to the problems of illicit drug use, in particular cannabis, by Aboriginal people generally, and young people in remote communities specifically, was difficult to locate. However, the reports and research that do exist identify the need for a number of strategies that will address control of supply, demand management, harm reduction, early intervention and treatment (Anderson & Wild, 2007, p. 228).

Given the lack of evidence, the summary below considers both cannabis specific and broader relevant best practice approaches to responding to AOD related harm for Aboriginal people. Harmful drug use is multi causal, it requires a range of complex approaches (Gray & Wilkes, 2010b). These approaches can be thought of as falling

under the three pillars of harm reduction, demand reduction and supply reduction within the National Drug Strategy (Commonwealth of Australia (Department of Health), 2017). Within these pillars approaches to harmful cannabis use need to include preventing uptake of cannabis use, promoting and supporting cessation among heavy users, supply reduction measures, addressing wellbeing and the social determinants of health at a community and individual level and supporting the Aboriginal workforce. All these steps need to be grounded in the principles of best practice in working with Aboriginal people, requiring Aboriginal self-determination, cultural safety and security, and being trauma informed (Coffin, 2007; McGough et al., 2018; National Indigenous Drug and Alcohol Committee, 2014).

In general, harmful cannabis use is best addressed from within existing structures and services rather than requiring specific services. In conceptualising the lack of evidence around cannabis interventions it is useful to consider again the comments of Lee and colleagues (Lee et al., 2007) who highlighted that although cannabis use rates are high, it is a neglected topic, and the comments of Butt and others, including the Victorian Aboriginal Legal Service, (Butt et al., 2010; Butt et al., 2014; Victorian Aboriginal Legal Service, 2020) who argue that cannabis use belongs on the health agenda and requires a health response. After summarising the principles of best practice below, the review will cover best practice approaches in harm and demand reduction, covering cannabis treatment separately. Policing responses in relation to supply reduction are beyond the scope of this review.

Principles of best practice

Despite a lack of evidence based interventions for cannabis use, there is a growing understanding of what is needed in the delivery of AOD services to Aboriginal people (Gray & Wilkes, 2010b) (Gray et al., 2014). This includes factors related to cultural safety of interventions; the need for Aboriginal leadership and holistic and integrated service delivery; interventions that are strengths based, family focused, trauma informed and are appropriately planned, resourced and evaluated using culturally informed methodologies.

These principles of best practice include:

Focus on social and emotional wellbeing

Appropriate responses to cannabis must occur with the recognition that drug use is connected to a holistic sense of health and wellbeing. Where health refers to the broader social, emotional and cultural wellbeing of individuals and communities (National Indigenous Drug and Alcohol Committee, 2014) and includes connection to land, culture, spirituality, ancestry, family and community (Gray & Wilkes, 2010b; National Indigenous Drug and Alcohol Committee, 2014; Strong Spirit Strong Mind, 2021).

Implied in this is the need to involve families and communities in any drug treatment, and in particular provide treatment and support to those supporting family members who may use drugs (Snijder & Kershaw, 2019). To address social and emotional wellbeing there is the need to provide holistic services that can support people who use cannabis to develop in other life areas. This requires integrated and supported treatment for those high levels of multiple need (Gray & Wilkes, 2010b).

Cultural determination, ownership and leadership

AOD treatment requires community ownership and consultation, without this, interventions risk being colonising forces (Percival et al., 2018). Further, partnerships, community consultation and Aboriginal ownership are required at all levels of service design, delivery and evaluation (Gray et al., 2014). The role of the Aboriginal Community Controlled Health sector is vital in ensuring that the needs of the community can be properly addressed (Gray et al., 2014).

Cultural security and cultural responsiveness

Culturally secure services for Aboriginal people are integral to best practice approaches and need to be embedded in Aboriginal ways of knowing and doing (Dudgeon & Ugle, 2014; Dudgeon et al., 2014b). Indeed, culturally safe approaches are acknowledged to

result in better outcomes (Gray et al., 2014). Cultural security ensures that cultural needs are included in policies and practices and cultural values are incorporated into the design, delivery and evaluation of services (Australian Human Rights Commission, 2011; Dudgeon et al., 2014b). This requires effort in upskilling both non-Indigenous practitioners and policy makers, but also ensuring that the Aboriginal workforce is adequately supported and their expertise acknowledged and appropriately remunerated. Further, it requires significant long term resourcing to support an increase in the number Aboriginal people in professional health workforce (Westerman, 2021).

Appropriate resourcing

Reviews of the Aboriginal AOD treatment sector have repeatedly highlighted the need for appropriate planning and resourcing of Aboriginal AOD interventions and recognised the harm of underfunding and non-recurrent funding and fragmented services (Gray et al., 2014). Service providers and intervention approaches need to be set up to succeed with adequate and continued funding and evaluation (Gray et al., 2014) and sufficient focus on implementation (Butt et al., 2014).

Demand reduction and harm reduction

Health promotion, education and awareness raising

Given the prevalence of heavy cannabis use detailed above, there is a clear need for health promotion materials to support the prevention of cannabis related harm and informed decision making. That said, it is important to consider that cannabis use may not be a priority harm for most communities (compared to alcohol and tobacco, for example) and as a consequence approaches need to fit within community needs and wishes (Butt et al., 2014). Furthermore, community health literacy regarding the harms of cannabis use is arguably low (Lee et al., 2008). Consequently, Lee and colleagues argued that investments in locally developed models to improve health literacy around cannabis use and specifically to acquaint young people with harms related to cannabis misuse are clear priorities, and that these must be developed and disseminated in collaboration with communities (Lee et al., 2008).

The National Cannabis Prevention and Information Centre (NCPIC), which was funded between 2007 and 2016, produced a number of cannabis specific resources for Aboriginal communities however since its defunding there has been diminished national level approaches to cannabis related harms. NCPIC undertook a number of awareness raising art and music projects which used the arts to develop representations of communities' and artists' beliefs about cannabis and its use (Howard et al., 2012). The goal of this project was to raise awareness in the particular communities of cannabis, its use and any associated and undesired consequences. The works tended to reflect how cannabis entered a community, stayed and became problematic and promoted visions of community without cannabis (Howard et al., 2012).

In addition to the awareness raising projects, NCPIC funded the development of a primary health care level intervention, the Could it be the Gunja? Project, which also produced a range of health promotion resources (Butt et al., 2014). These included posters and pamphlets which were developed in community partnership, focused on harms of concern to communities and piloted prior to dissemination. In line with community consultation feedback, the resources aimed to stay away from 'no' messages and instead aimed to provide information about cannabis in an open, non-judgemental and informative way (Butt et al., 2014). The dissemination of materials was linked to upskilling of primary health care staff in responding to cannabis use (Butt et al., 2014).

Awareness raising has value in not just providing people with information from which to make an informed choice about cannabis use but also because it provides an opportunity to shift favourable attitudes about cannabis which may precede and predict use (Fishbein & Ajzen, 2009). Another example of cannabis awareness raising and health promotion comes from Lee and colleagues (Lee et al., 2008) who sought to disseminate the findings of their research into cannabis use in Arnhem Land using pictorial and local language graphics to convey the concepts and meanings that arose from their research. Evaluation demonstrated widespread satisfaction with the resources and increased understanding of the impacts of cannabis use. The authors noted the importance and value of community

partnership and in particular ensuring local leadership was listened and responded to (Lee et al., 2008).

The resources and approaches above are all grounded in community ownership and storytelling, which is consistent with best practice, however none are currently funded or ongoing projects. A number of other cannabis information, awareness raising and health promotion materials exist with a number being developed and led by Aboriginal organisations and teams, for example the Strong Spirit Strong Mind Gunja pamphlets developed by WA Mental Health Commission (Western Australia Mental Health Commission, 2020), however evaluation of these resources and their dissemination is lacking. There is a need for culturally appropriate and culturally driven health promotion (Percival et al., 2018) on harmful cannabis use. Over the years considerable investment has been made in health promotion, yet efficacy is limited by poor evaluation resourcing (O'Donoghue et al., 2014) and limited commitment to the implementation of resources into practice (Butt et al., 2014; Percival et al., 2018). Effective health promotion needs to strengthen capacity, tailor resources for diverse groups and have effective reciprocal communication (Percival et al., 2018). O'Donoghue and colleagues (O'Donoghue et al., 2014) argue that best practice in the development of health promotion materials requires planning, targeting, partnerships and evaluation – leading back into planning with community participation integral at each step in the cycle. Further effective health promotion requires respecting leadership within the Aboriginal community to develop relevant messages (Pyett et al., 2008). New approaches would do well to focus on social media and specific marketing for the intended audience, which has been identified as a valuable approach in the reduction of tobacco (Colonna et al., 2020), alcohol (Gray et al., 2018) and methamphetamine related harm (Snijder & Kershaw, 2019).

A key component of prevention approaches are school-based interventions (Teesson et al., 2012). These interventions include universal programs (aimed at all children) and targeted interventions (aimed at high-risk individuals and groups). More recent approaches to prevention focus on harm minimisation messaging and increasing the capacity of young people to make informed choices about drugs as opposed to abstinence-based approaches (Clare et al., 2011). Given the high prevalence of cannabis use and the potential for misinformation, school-based education programs are a vital component of harm prevention. A detailed review of school-based programs is beyond the scope of the current paper, however it is important to recognise their importance in the prevention of cannabis related harm (Clare Newton et al., 2011), yet there is a dearth of evidence to support the efficacy of school-based education programs for Aboriginal young people (Snijder et al., 2020). The most commonly utilised school-based programs which target cannabis use in Australia are the Climate Schools program (Snijder et al., 2020) and Positive Choices Drug and Alcohol Information (Positive Choices, 2017; Stapinski et al., 2017). Of note, one recent school-based intervention focusing on both well-being and AOD use has been designed specifically for Aboriginal young people – The Strong and Deadly Futures Program (Stapinski et al., 2022). Snijder and colleagues (Snijder et al., 2021) describe the Strong and Deadly Futures program as a six-lesson, curriculum-aligned wellbeing and substance use prevention program utilising a story-based structure that was designed for, and with Aboriginal young people. The program includes three core approaches; firstly, combining effective components of mainstream prevention with cultural elements, highlighting Aboriginal cultural strengths; secondly avoiding stigma and focusing on the strengths of cultural diversity by including both Aboriginal and non-Indigenous students; and thirdly using digital technology to enhance engagement. Strong and Deadly Futures is currently being trialled, however an early pilot study identified that it had good feasibility and acceptability for both students and staff and shows promise as an option for school-based prevention for cannabis related harms (Routledge et al., 2022).

Community interventions

Localised approaches to reducing drug related harm are worthy of attention, these approaches need to be based on community strengths as well as having effective and integrated strategies (Snijder & Kershaw, 2019). Only one whole of community response to cannabis has been noted in the literature; the Weed it Out project which took place in Cape York and the Torres Strait in Queensland as a partnership between peak Aboriginal

and Torres Strait Islander community representatives, James Cook University and the Queensland Police (Robertson & Dowie, 2008). The project focused on community led demand reduction activities, awareness raising (around mental health effects and legal consequences) and supply reduction priorities (Robertson & Dowie, 2008) with the aim of changing community attitudes to cannabis use and reducing supply (Howard et al., 2012). While other programs have not been documented to date, community wide approaches have demonstrated usefulness in responding to other drugs such as methamphetamine (Snijder & Kershaw, 2019) and alcohol. A review and further development of whole of community responses to cannabis use are warranted.

Screening and brief intervention in primary health and antenatal health

Primary health care services and maternal health services are ideally positioned to provide health promotion, and also screening and brief intervention (with referral if necessary) for those experiencing or at risk of experiencing substance related harm (Anderson, 2007; Copeland et al., 2001; Gray et al., 2014; Moyer et al., 2001). Screening and brief intervention for tobacco and alcohol use have been widely trialled in Aboriginal health settings (Brady et al., 2002; Clifford & Shakeshaft, 2011; Clifford, & Shakeshaft, 2010). Screening and brief intervention identifies if someone uses cannabis, if so at what level of harm and can identify potential opportunities for referral or health advice. Screening and brief intervention approaches are valuable as they are low cost to deliver and can provide useful assistance to those who need minimal help while providing a referral pathway for those who require more intensive service provision. Brief interventions are also guided by an individual's motivation to change and as such avoid becoming top down or mismatched (Butt et al., 2014).

One cannabis screening and brief intervention program has been trialled in Aboriginal Community Controlled Health (ACCHO) primary health settings. The *Could it be the Gunja?* Project funded by NCPIC and undertaken by a partnership between researchers and six ACCHOs implemented cannabis screening and brief intervention across six sites (urban, regional and remote) (Butt et al., 2009; Butt et al., 2014; Howard et al., 2012). During consultation the project identified that few staff regularly talked to clients about cannabis, further many reported not feeling comfortable talking about cannabis, yet most reported that they felt cannabis use was having a significant effect on the local community. Consequently, the goal of the project was to introduce screening and brief intervention for cannabis use and cannabis information resources to primary health care clients (resources are described above). Most importantly, the project developed a comprehensive implementation plan to ensure that the introduction of screening and brief intervention included consultation, training and support to staff. As an example of outcomes before the project started only 20% of clinic staff (including nurses, GPs and health workers) regularly talked to clients about cannabis. At the end of the project 60% of participants were talking to their clients about cannabis use (Howard et al., 2012). In addition, at the end of the project participants felt more comfortable asking about cannabis and felt that they knew more about cannabis and had the skills to help people who use cannabis (Butt et al., 2014). The project also highlighted the need to separate screening for cannabis use from other illicit drugs such as methamphetamines. As other research as shown, when people receive screening for illicit drugs they may not identify cannabis as an 'illicit drug' due to its more normalised status (Wilson & Butt, 2019).

Given the high rates of cannabis and tobacco co-use, tobacco intervention and quit smoking programs may also provide an avenue for effective cannabis interventions, including health promotion and brief intervention (Butt, 2020).

National research has identified that medical practitioners are less likely to ask pregnant women about cannabis use than tobacco (Gould et al., 2017) and emphasised the role of practitioners in screening pregnant women for cannabis use. A similar recommendation has been identified in research focused on Aboriginal women (Brown et al., 2016; Passey et al., 2014). Given the emerging success of a number of programs targeting tobacco use among Aboriginal mothers and identification of factors which promote success (Bovill et al., 2019; Harris et al., 2019), it is possible that similar

screening and brief intervention approaches that can target cannabis in addition to tobacco are suited to antenatal settings.

Improving the social determinants

It is widely acknowledged the interventions that target the social determinants of health will result in reductions in drug use, including cannabis, improve quality of life and reduce the life expectancy gap between Aboriginal and non-Indigenous Australians (Brown et al., 2019; Gray & Wilkes, 2010b). Considerable effort is required to target the social determinants of health if any approach to reducing symptoms of inequality - such as harmful drug use – are to be successful. Of particular relevance to cannabis use are interventions which are also linked to mental health and justice involved populations and therefore include programs which address housing, family and domestic violence, education for Aboriginal people (Gray & Wilkes, 2010b) and racism within the broader Australian community.

Youth wellbeing and diversion approaches

Prevention of the uptake of cannabis use among young people is an important component of reducing cannabis related harm. Considering cannabis use is one component of at-risk behaviour among young people, holistic approaches which focus on wellbeing as well as systemic factors across multiple domains are likely the most suitable interventions. An example of comprehensive approach for at risk young people are those which promote school retention and target multiple risk factors. The Clontarf Academy is one such successful approach which uses Australian Rules football as a mechanism of engaging boys in school, improving self-esteem, developing skills, developing prosocial behaviour and providing opportunities to experience rewards and achievement. Eighty per cent (80%) of the young males in the program finish Year 12, compared to a 45% retention rate for Aboriginal students nationally (Clontarf Foundation, 2018).

Treatment for harmful cannabis use

Treatment approaches for harmful cannabis use and Cannabis Use Disorder include various counselling approaches, self-help and peer support programs, the provision of social and vocational skills, residential rehabilitation and, additionally, there is potential for pharmacotherapy. The international literature shows that treatment for cannabis problems can be effective (Copeland & Pokorski, 2016) which can inform discussion of best practice. A complication in the treatment of harmful cannabis use internationally is the observation that most treatment seekers do not seek treatment until they are experiencing significant harm and that treatment access is a significant barrier (McGough et al., 2018). Further the results presented in the preceding sections demonstrate that treatment seeking for cannabis use among Aboriginal people is low in consideration of the high rates of prevalence. Thus, it is important to recognise that not only are evidence based treatments needed, but they need to be easily accessible (Haber & Riordan, 2021).

Counselling based treatment approaches

There are a number of counselling based clinical approaches which have demonstrated efficacy in treating cannabis and other drug use in non-Aboriginal populations, which have an evidence base for Aboriginal people. Evidence based approaches to the treatment of cannabis use include cognitive behaviour therapy (CBT), motivational enhancement therapy (MET), combination CBT and MET, contingency management (CM), and family therapy (Copeland et al., 2017; Nordstrom & Levin, 2007) with evidence emerging for the validity of third wave CBT approaches, such as Acceptance and Commitment Therapy (ACT) and Mindfulness Based Relapse Prevention (Copeland et al., 2017), with many of these approaches having been used with Aboriginal people (Haber & Riordan, 2021).

The strongest evidence for the treatment of harmful cannabis use is for CBT, MET and combined CBT-MET (Copeland et al., 2017), and CBT-MET with reward for abstinence (CM) (Gates et al., 2016), however a recent systematic review suggested that MET did not reduce cannabis use among adolescents (Steele et al., 2020). Both CBT

and MET have been successfully adapted for use among Aboriginal people for a range of other mental health and AOD presentations (Bennett-levy et al., 2014; Nagel et al., 2009). As such CBT and MET approaches are recommended as therapeutic approaches for Aboriginal people presenting for treatment with harmful cannabis use.

A specific CBT based approach which has demonstrated acceptability for Aboriginal people is the Community Reinforcement Approach (CRA) (Calabria et al., 2013), which uses CBT and MET principles to identify alternatives to drug and alcohol use and to develop strategies to reward non-use. CRA Family Training (CRAFT) works with the family as well as the client by supporting the family to remove factors that reinforce substance use and promote factors that reinforce not using. The involvement of family in the treatment of drug use has been identified as an important factor in treatment. Calabria and colleagues worked with Aboriginal clients of an Aboriginal Community Controlled Organisation using the CRA/CRAFT approach, with reports it was found to be acceptable and feasible. Similarly CRAFT was highly acceptable with family members or friends who wanted to support their loved one to start alcohol treatment (Calabria et al., 2013).

Importantly, any discussion of counselling approaches to drug use needs to consider the common factors of therapy (Wampold, 2015). The common factors include the relationship between the client and the practitioner, the explanation of the concern, and the specifics of treatment itself. Studies regarding common factors emphasise that treatment outcomes are not simply linked to the approach of a practitioner but also to the relationship between the client and practitioner. In the alcohol and drug context Project Match, the largest alcohol treatment study conducted to date in the USA, found that therapy type did not predict outcome, the authors concluded that therapeutic relationship was critical in outcome (Project MATCH Group, 1997). While much research focuses on the efficacy of a certain therapy type, often it is the relationship between the client and the service provider, or indeed factors external to therapy which facilitate change (Wampold, 2015). Thus, a focus on engagement and relationship building with Aboriginal clients should be regarded with as much significance as the therapeutic approach. Factors which negatively influence engagement include a lack of cultural appropriateness of service delivery, language barriers, concerns about confidentiality, shame, fear of being judged, or discrimination, fear of child removal, and difficulties with accessibility (Haber & Riordan, 2021). Among at risk young women, treatment and counselling approaches which are based on yarning, opportunistic, and available on demand (not long waitlists), have been identified by young women as factors which facilitate engagement and help seeking (Wilson & Butt, 2019).

Peer support approaches

Peer support approaches such as 12-step programs and SMART Recovery are an important component of the treatment mix for substance use. Twelve step programs (Alcoholics Anonymous) have had mixed feedback in regards to cultural appropriateness of the approach (Taylor et al., 2010); aspects of 12 step approaches, such as gender mixing and confrontational therapy are not considered culturally safe by some commentators. Further, the disease model has also been criticised as disempowering (Miller & Rowse, 1995). That said, workers with lived experience make peer lead programs appealing. SMART Recovery is an alternative secular peer support program using a CBT framework. A recent study using a Delphi approach investigated the cultural utility of SMART Recovery for Aboriginal people (Dale et al., 2021). Results highlighted the importance of Aboriginal consultation and highlighted the need for the implementation of a culturally adapted facilitation handbook for SMART Recovery that included cultural and contextual information and was informed by the lived experience of Aboriginal drug users.

Residential rehabilitation

Generally, residential treatment has not been found to be more effective than non-residential treatment (Babor et al., 2008), however it is a popular treatment option for those with severe drug use problems. There is some evidence that rehabilitation may be more effective for particular groups of clients with more complex psychosocial circumstances and more significant deterioration in functioning (Gray & Wilkes, 2010b). Taylor and colleagues surmised that mainstream residential rehabilitation was

problematic due to cultural incongruence (different conceptions of illness, power imbalances, regimented time-tabling) and lack of Aboriginal staff (Taylor et al., 2010). Nathan and colleagues (Nathan et al., 2020) highlighted the need for holistic residential rehabilitation for young Aboriginal people who are experiencing drug related harm and reported on the outcomes of an Aboriginal program which included a residential program. The program duration was between 30 days and three months and included holistic treatment incorporating life skills, case management and therapy within a drug free environment (Nathan et al., 2020). The authors noted high levels of case complexity among the client group including high levels of suicidal ideation, self-harm, justice involvement and unstable accommodation among participants at commencement of treatment (Nathan et al., 2020). With respect to cannabis use the results identified that the majority of those using cannabis at intake were still using cannabis at three months post treatment (64%), however there was a significant reduction in frequency of cannabis use. Looking beyond the metrics of drug use, the authors found that self-harm and justice involvement had significantly decreased (Nathan et al., 2020). The results demonstrate the importance of treatment approaches which target a range of determinants of health and are culturally appropriate. A final note on the use of residential rehabilitation is the lack of funding for through care, or follow up (Gray et al., 2014) to support those leaving rehabilitation to maintain treatment gains when returning home. Without adequate through care support the investment in rehabilitation can be short lived.

Pharmacological approaches

There are no current evidence based pharmacological approaches to the treatment of cannabis use approved in Australia, although a number of recent trials have shown promise (Vandrey & Haney, 2009) (Copeland & Pokorski, 2016) (Freeman et al., 2020; Kondo et al., 2020). Potential pharmacological approaches include agonists, medications to reduce craving and medications to address the symptoms of withdrawal. A number of studies are examining the effectiveness of medications to address symptoms of withdrawal such as sleep (zolpidem) and reduce anxiety (buspirone) (National Institute on Drug Abuse, 2021). Other agents being studied include those which may reduce withdrawal by inhibiting the breakdown of the body's own cannabinoids. For those who use tobacco with cannabis, following assessment of nicotine addiction and withdrawal, nicotine replacement therapy may be indicated to manage co-occurring symptoms of nicotine withdrawal (Bittoun, 2016).

Agonist therapies are the most promising, such as nabiximols and nabilone, which have been found to reduce measures of withdrawal and relapse in initial trials and warrant further exploration in the management of aspects of cannabis-use disorder (Copeland & Pokorski, 2016). Similarly CBD has also shown promise, a recent preliminary study suggested that CBD was marginally more effective than placebo in reducing cannabis risk and had a low risk safety profile (Freeman et al., 2020).

Co-morbidity and mental health services

Considering the relationship between cannabis use and mental ill-health and high rates of comorbidity, there is need for mental health services to have capacity to address cannabis use, for drug treatment services to have capacity to address mental health presentations, and for services which address comorbidity. Implied in this is the need for workplace capacity building within both the substance-use treatment sector and the mental health sector.

In terms of interventions to address comorbidity, best practice guidelines suggest that comorbid substance-use and mental health disorders should be assessed and treated concurrently (Marel et al., 2016) (Copeland & Pokorski, 2016), or, in line with patient centre care in the order identified by the client (Marel et al., 2016). Research has provided some preliminary support for brief MET interventions; in a small sample of Aboriginal people in remote communities with AOD and mental health comorbidity, brief MET was found to reduce symptoms of mental health and AOD use disorders (Nagel et al., 2009). In summary, despite the lack of research evidence there are a range of treatment and prevention approaches that can address cannabis related harms.

Policy approaches to cannabis use

Cannabis and health policy

There are no national policies relating specifically to cannabis use among Aboriginal people. The health policy frameworks relevant to cannabis use and cannabis related harms include the National Drug Strategy 2017-2026 (NDS) (Commonwealth of Australia, Department of Health., 2017) which highlights a harm mitigation approach whereby policy focuses on the three pillars of demand reduction, supply reduction and harm reduction, and the now expired National Aboriginal and Torres Strait Islander Peoples' Drug Strategy 2014-2019 (Intergovernmental Committee on Drugs., 2015) which was a sub strategy of the NDS. The NATSIPDS aimed to improve the health and wellbeing of Aboriginal and Torres Strait Islander people by preventing and reducing the harmful effects of AOD on individuals, families, and their communities. The strategy identified four priority areas: (1) build capacity of AOD workforce (2) increase access to culturally appropriate programs (3) strengthen partnerships (4) establish meaningful performance measures (Intergovernmental Committee on Drugs 2015; Gray et al., 2014). Critics of the strategy suggest that it lacked a framework from which to achieve the priority areas and that fragmented policy and service delivery would likely continue (Gray et al., 2014). Although cannabis is mentioned in the NATSIPDS it does not have any associated policies or priorities. In addition, reduction in substance use is embedded within the national Closing the Gap targets and outcomes (Australian Government, 2020). It is also relevant to note that community organisations have emphasised the need for a health policy and health response to cannabis use as holding better potential than current policies which focus on the legal status of cannabis use as a deterrent (Victorian Aboriginal Legal Service, 2020).

Changes in policy that are emerging at a national level relate to the medicinal use of cannabis and as such are not reviewed. The summary below examines policy surrounding the legality and criminalisation of cannabis and cannabis use.

Approaches to cannabis regulation

There are many different legal frameworks governing the use and supply of drugs such as cannabis - the primary approaches are: full prohibition (use, possession and supply are criminal offences), depenalisation (use and possession are still criminal offences but with lighter penalties e.g. education and/or treatment), decriminalisation (use and possession are not criminal, criminal penalties are replaced with civil penalties, and drug supply remains a criminal offence) and legalisation (use of a drug is legal as is drug supply) (Lee & Ritter, 2016).

In Australia, as in much of the world, the primary policy response to cannabis use has included prohibition, depenalisation and decriminalisation. These approaches focus on reducing drug related harm via the legal framework. As described in the preceding sections the criminalisation of recreational cannabis use can result in significant negative consequences (including incarceration and fines), further it is resource intensive and can limit people's willingness to engage in treatment, prevention and in research participation (Butt et al., 2014; Hall et al., 2019). In addition, cannabis harms are considered moderate in comparison to other illicit drugs such as opioids and alcohol (Degenhardt et al., 2013; Hall et al., 2019). This has prompted governments around the world to reconsider cannabis. Recently the cannabis policy landscape has fundamentally changed with the legalisation of cannabis use and supply for recreational purposes, particularly in the Americas (Decorte et al., 2020). In 2013, Uruguay was the first country to legalise and regulate cannabis use for recreational purposes. Recreational cannabis is now legal in 18 US states (Wikipedia, 2021), and across Canada (Decorte et al., 2020). The legalisation of cannabis in the Americas has stimulated consideration of cannabis legalisation in many countries (Decorte et al., 2020). In 2020, a proposal to legalise recreational cannabis in New Zealand was narrowly defeated in a referendum (50.7% against) (Fischer & Hall, 2021). In Australia, the ACT legalised the possession and cultivation of cannabis as of 31 January 2021 (Mannheim & Lowrey, 2020) and the legislation of

cannabis for recreational use is also being considered in Victoria (Parliament of Victoria Legislative Council Legal and Social Issues Committee, 2021). There are no other Australian jurisdictions which at the time of writing have cannabis legalisation proposals under active consideration. However, given the momentum internationally, it is timely to consider the international evidence on the impact of cannabis legalisation, and to consider its potential implications for Aboriginal people and Australia more broadly. This and future reviews of international regulations will inform the cannabis legalisation debate which is likely to increase in this country in coming years.

Australia has a long history of cannabis reforms beginning in South Australia in 1987, with the implementation of Australia's first Prohibition with Civil Penalties Scheme, followed by similar schemes in the ACT (1992), the NT (1996) and briefly in WA (2004-08) (Hughes, 2020). Under these schemes cannabis possession and use remains illegal but, much like speeding in a motor vehicle, is subject to civil (fines) rather than criminal (record and potential jail) penalties if the fine is paid by the due date. Prohibition with Cautioning and Diversion (to treatment or education) for first, second or third offenders depending on jurisdiction, operates for cannabis in Qld, NSW, Vic, and Tas. The efficacy and impact of these approaches for Aboriginal people has not been adequately described, and concern remains regarding the heightened unintended impact of non-payment of fines for Aboriginal people (Spiers & Gilbert, 2011).

In contrast, in the US and Canada, the legalisation models of cannabis policy applied can be described as profit-driven commercialisation, similar to the legal tobacco and alcohol space. While it is too early to say what the definitive impacts of fully commercialised legal cannabis markets are, the salient findings which have relevance for Australia, and in particular Aboriginal people are summarised below.

Selected evidence on fully commercial legal cannabis markets

Research on the US and Canadian cannabis market is being published at a rapid rate and there is not the space here to cover it all. Rather the most salient findings to date with potential relevance to Aboriginal people are summarised.

Firstly, unsurprisingly there have been large (>80%) and rapid reductions in cannabis related convictions as a result of cannabis legalisation (e.g. Mosher & Atkins, 2020) but youth are often excluded from the legalisation provisions and there appears to have been some refocusing of police resources towards young cannabis users (Fischer et al., 2021). Furthermore, there is evidence emerging that in Alaska, for example, while there were declines in the proportion of black youth apprehended after legalisation, there were no changes for Indigenous youth, which remained at over twice the rate of white youth after legalisation (Firth et al., 2020).

Overall impacts of legalisation on rates of cannabis use seem mixed. While there is no substantial evidence on increases in rates of regular use by young people (Zuckermann et al., 2021) and pregnant women (Skelton et al., 2021), use by adult regular users (Smart & Pacula, 2019), and in particular 'daily or almost daily' use (Rotermann, 2021), has increased. Furthermore, given the strong relationship between drug price, use and harm, it is also of concern that cannabis prices have fallen rapidly in legalisation states in the US. For example in Colorado the price of cannabis flower (heads) dropped by about half in the first four years and the proportion of total market share held by high potency cannabis products (e.g. hash, waxes, shatter and vape cartridges) doubled in the same period (Orens et al., 2018). Thus, there is concern that legalisation may increase rates of use and the accessibility of higher potency products.

Similar to the alcohol and tobacco industries, the impact of cannabis industry activity is important to acknowledge. Early on there was evidence of industry lobbying against public health regulations (Subritzky et al., 2016). Furthermore, industry documents showed that, like the tobacco industry before them, the cannabis industry have targeted heavy users (Subritzky et al., 2016). This strategy is consistent with subsequent Colorado market data which showed that 'daily or near-daily' users comprised 22% of cannabis users but were responsible for 71% of the cannabis consumed in the legal market (Orens et al., 2018). Despite attempts to keep them at bay and have a more public-health-focused system, multinational alcohol, tobacco and soft drink companies have taken big

shares in the Canadian cannabis market (Hall et al., 2019). While many of the laws aim to limit advertising of cannabis products, especially to youth, there is evidence that companies are getting around restrictions on advertising by going to social media and YouTube (Subritzky et al., 2020) and there is evidence emerging that adolescents are seeing this alternative media content and their cannabis use is related to this media exposure (Whitehill et al. 2020). Particularly relevant in this context, just like with alcohol, several US states have found that cannabis retailers tend to locate in areas with more racial and ethnic minority residents, more poverty, and more alcohol outlets (Unger et al., 2020) and the greater the density of cannabis outlets, the greater the cannabis use, frequency of use and future intention to use (Pedersen et al., 2021). In considering future options for Australian cannabis policy the impacts of industry, and their potential impact on Aboriginal communities, need to be understood.

Thus, evidence that has accrued to date from the fully commercialised cannabis legalisation models in North America suggests Australia should be wary about taking a similar approach. Many of the observed problems of commercial cannabis markets have parallels with the tobacco and alcohol markets that have caused considerable harm to Australians in general, and Aboriginal people in particular. Furthermore, already we are seeing in the US and Canada that, while legalisation has resulted in a rapid reduction in the significant social costs of criminalisation, which has disproportionately impacted people of colour, the public health burden of commercialisation of cannabis does seem substantial and disproportionately felt by Indigenous people and communities characterised by social and economic disadvantage.

Middle ground options

Considering the above, a number of scholars (e.g. Kilmer, 2017) have pointed out that there are a range of 'middle ground' policy options for cannabis between strict prohibition with severe penalties at one end to full profit-driven commercialism. These include: home cannabis cultivation, cannabis social clubs, non-profit cannabis companies, and cannabis community trusts (Caulkins & Kilmer, 2016). These middle ground options have received little media or research attention and are thus not considered by policy makers and the public when considering the way forward for cannabis policy (Decorte & Pardal, 2017), but there are a number which have real promise as ways of legalising cannabis without repeating the public health disasters of decades of profit driven tobacco and alcohol markets (Decorte et al., 2020). In the current context there are three of particular note: Cannabis Social Clubs, Cannabis Community Trusts and Mixed Models. These three models aim respectively to: target public health goals by meeting supply needs but regulating a consumer's use and integrating health warnings; prevent and reduce cannabis-related health and social harms at a local level by involving communities in decisions about cannabis sales and directing profit back into positive community initiatives such as drug treatment and prevention activities; or, provide a mixture of approaches which can provide legal access to cannabis in a way that reduces the adverse impacts of criminalisation on users, families and communities, and avoids or minimises many of the adverse public health effects of profit-driven commercialisation (Decorte, 2018) (Wilkins, 2018; Wilkins & Rychert, 2020). It is unlikely that any single middle ground model will meet the needs of all cannabis users and affected communities. Rather, should governments wish to legalise cannabis, approaches comprising a number of elements of the 'middle ground' options tailored to meet the local needs and issues regarding cannabis, are possible. Embedded in these approaches are the need for self-determination and genuine community consultation around policy development and implementation.

Future directions

High prevalence of cannabis use coupled with a lack of available resources to address cannabis related harms warrants attention from researchers, health practitioners and policy makers. The current review has drawn from a wide variety of sources, and it is clear there is a need for more detailed research into cannabis use, its social context of use and related harms among Aboriginal people. Thus, future research needs to include high quality epidemiological research, longitudinal research, and qualitative research. The

use of cannabis by young people, cannabis and mental health comorbidity, and community understanding of cannabis use are three areas of need.

There is a need for increased investment in existing structures and services to better address cannabis related harms. Cannabis specific resources for health promotion and prevention that are appropriately resourced, designed and evaluated are clearly indicated. Increasing the capacity of existing drug treatment, tobacco cessation, and social and emotional wellbeing (including mental health) services to responding to cannabis use is also needed. Whole of community approaches are also indicated and warrant further attention. The development of community approaches requires sufficient time frames from which to engage communities in the topic of cannabis, develop appropriate responses and to evaluate them. All approaches to cannabis related harms need to be guided by best practice principles in the development and evaluation of culturally safe services and requires community ownership, oversight and sustained funding.

Finally, as the international discourse around cannabis moves away from prohibition and towards legalisation, considerable community consultation is required to identify suitable approaches to regulation that minimises the risks of legislation which criminalises those who use cannabis and legislation which is based on profit-driven commercialisation of use.

Concluding comments

As highlighted by the UNODC there has been a global increase in the potency of cannabis, this increase has been matched by a reduction in the perception that cannabis use is harmful. These developments highlight the need for ongoing research and further investment in health-based approaches to minimise cannabis related harm more broadly. International research shows that cannabis use, particularly when commencing in adolescence, has individual and community, health, mental health and wellbeing harms.

Although detailed epidemiological data is lacking, the research available demonstrates that among Aboriginal people cannabis use prevalence is high, and among some communities cannabis use is normalised; prevalence among young people is high; and there are significant rates of cannabis use dependence. Furthermore, the use of cannabis with alcohol, tobacco and other drugs is concerning and warrants investigation. The co-use of cannabis and tobacco is particularly noteworthy. The comorbidity of cannabis use and mental health disorders was clearly noted in the review, and has implications for the prevention and treatment of cannabis related harms. Harmful cannabis use is likely to arise from social disadvantage and perpetuates it. Cannabis is related to a range of psychosocial harms including engagement in the criminal justice system, violence, early withdrawal from education, and lack of employment, as well as the impacts on mental health.

There is a lack of evidence base to identify or review best practice approaches in cannabis prevention and treatment at the individual, family and community level. Of particular concern is the lack of programs and resources with community ownership or co-design. There is a clear need for the development of culturally safe prevention and treatment resources that can address cannabis related harms. That said, a range of promising opportunities exist; including school-based prevention, health promotion resources, and increasing capacity in mental health and AOD services to better meet the needs of cannabis related presentations. These opportunities can be maximised if the best practice principles of focusing on social and emotional wellbeing, cultural safety, self-determination and adequate resourcing are adhered to, alongside broader approaches to improving the social determinants of health. Finally, the review considered the legal status of cannabis and identified the range of policy options that exist as an alternative to prohibition of cannabis.

Cannabis related harms and the prevalence of cannabis use receive scant attention, yet they are concerning and are an important item on the Aboriginal health agenda.

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