

Supplementary results for

An ecological model of drug and alcohol use and related harms among Aboriginal and Torres Strait Islander Australians: a systematic review of the literature

Mieke Snijder¹, Briana Lees², Annalee Stearne³, James Ward^{4 5}, Sophia Garlick Bock², Nicola Newton², Lexine Stapinski^{2*}

¹ The Institute of Development Studies, The University of Sussex, Brighton, BN1 9RE, United Kingdom

² The Matilda Centre for Research in Mental Health and Substance Use, School of Medicine, Medicine and Health, Sydney, 2006, The University of Sydney, Australia

³ Curtin University, Perth, 6102, Western Australia, Australia

⁴ South Australia Health and Medical Research Institute, Adelaide, 5000 South Australia, Australia

⁵ Flinders University, Adelaide, 5042, South Australia, Australia

*Corresponding author

Correspondence to:

Dr Lexine Stapinski; lexine.stapinski@sydney.edu.au +61 2 8627 9039

Postal address: Level 6, G02 Jane Foss Russell, The Matilda Centre for Research in Mental Health and Substance Use, School of Medicine, Medicine and Health, The University of Sydney, Sydney, 2006, Australia

Supplementary Results.

Supplementary Table 1. Search strategy for systematic review of risk and protective factors of substance use and related harms among Aboriginal Australians (example: Medline search)

Supplementary Table 2. Summary of risk and protective factors for substance use identified in the included studies (n=38_a)

Supplementary Figure 1a: Odds ratios of age and gender associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.

Supplementary Figure 1b: Odds ratios of mental and physical health and lifestyle factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.

Supplementary Figure 1c: Odds ratios of education and employment factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.

Supplementary Figure 1d: Odds ratios of other socioeconomic status factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.

Supplementary Figure 2: Odds ratios of relationship factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people

Supplementary Figure 3: Odds ratios of community factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.

Supplementary Figure 4: Odds ratios of culturally distinct and societal factors associated with tobacco and alcohol use and related harms amongst Aboriginal and Torres Strait Islander people.

Supplementary Table 2. Search strategy for systematic review of risk and protective factors of substance use and related harms among Aboriginal Australians (example: Medline search)

1	((Aborigin* OR "Torres Strait Islander" OR Aboriginal) and Australia).mp.
2	((risk OR protec* OR resilienc* OR underlying OR ecological OR vulnerab* OR psychosocial) AND (factor OR mechanism OR character*).mp.
3	(wellbeing OR mental health OR substance OR alcohol OR drug OR tobacco).mp.
4	limit 1 to yr="1990 - 2017"
[mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	

Supplementary Table 2. Summary of risk and protective factors for substance use identified in the included studies (n=38_a)

First author (year)	Findings Ecological level	Specific results
Quantitative (n=26)		
ABS (1995)	Individual Community	Males = ↑ tobacco use vs females (OR=1.37, CI 1.35-1.40)*; ↑ alcohol use vs females (OR=1.85, CI 1.82-1.88)* Urban = ↑ alcohol use problems in community vs rural (OR=1.58, 1.54-1.63)*; capital city (OR=2.82, CI 2.75-2.89)*, urban = ↑ reported cannabis use problems in community vs capital city (OR=1.99, CI 1.95-2.04)*; rural (OR=2.61, CI 2.55-2.66)*, urban = ↑ petrol sniffing problems in community vs rural (OR=1.32, CI 1.28-1.36)*; capital city (OR=1.50, CI 1.45-1.54)*; capital city = ↑ other substance use problems in community vs urban (OR=1.19, CI 1.16-1.22)*; rural (OR=3.24, CI 3.14-3.34)*, capital city = ↑ glue sniffing problems in community vs urban (OR=1.02, CI 0.99-1.06)*; rural (OR=2.67, CI 2.57-2.79)*
ABS (1996)	Individual Community	Males = ↑ heavy tobacco use vs females (28% vs 18%), ↑ alcohol use vs females (47% vs 29%); females = ↑ alcohol abstinence vs males (33% vs 25%) 20-24yrs = ↑ tobacco use vs 15-19yrs (60% vs 37%) Urban = ↑ alcohol use problems vs rural (84% vs 75%), ↑ cannabis use problems vs rural (68% vs 42%)
ABS (2004)	Individual	Completed yr9 or below = ↑ alcohol use vs completed yr10-11 (OR=1.14, CI 1.11-1.17)*; yr12 (OR=1.09, CI 1.07-1.12)*; non-school qualification (OR=1.38, CI 1.35-1.42)*, completed yr9 or below = ↑ tobacco use vs completed yr10-11 (OR=1.18, CI 1.16-1.20)*; yr12 (OR=1.95, CI 1.91-1.99)*; non-school qualification (OR=1.59, CI 1.56-1.63)* Males = ↑ high risk alcohol use vs females (OR=1.33, CI 1.31-1.36)*; ↑ tobacco use (OR=1.16, CI 1.14-1.17)* Males 15-24yrs = ↑ tobacco use vs females 15-24yrs (OR=1.03, CI 1.00-1.06)*, males 25-34yrs = ↑ tobacco use vs females 25-34yrs (OR=1.01, CI 0.98-1.04)*, males 35-44yrs = ↑ tobacco use vs females 35-44yrs (OR=1.22, 1.18-1.26)*, males 45-54yrs = ↑ tobacco use vs females 45-54yrs (OR=1.26, 1.21-1.31)*, males 55yrs+ = ↑ tobacco use vs females 55yrs+ (OR=1.85, 1.76-1.93)*; Males 15-24yrs = ↑ high risk alcohol use vs females 15-24yrs (OR=1.08, CI 1.04-1.13)*, males 25-34yrs = ↑ high risk alcohol use vs females 25-34yrs (OR=1.32, CI 1.27-1.38)*, males 35-44yrs = ↑ high risk alcohol use vs females 35-44yrs (OR=1.16, CI 1.11-1.20)*, males 45-54yrs = ↑ high risk alcohol use vs females 45-54yrs (OR=1.83, CI 1.73-1.93)*, males 55yrs+ = ↑ high risk alcohol use vs females 55yrs+ (OR=3.35, CI 3.12-3.60)*
ABS, AIHW (2008)	Individual Relationship Community	Incomplete education = ↑ tobacco use vs completed yr12 (55% vs 34%)*, ↑ alcohol use vs yr12 (17% vs 12%)*, ↑ illicit substance use vs yr12 (35% vs 28%) Males = ↑ illicit substance use vs females (54% vs 45%), ↑ alcohol use (binge drinking) vs females (24% vs 15%), ↑ lifetime risky alcohol use vs females (22% vs 8%), ↑ alcohol use (chronic high risk use) vs females (19% vs 14%) Psychological distress in past mth = ↑ tobacco use , ↑ chronic alcohol use , ↑ weekly binge drinking (no statistics provided) Unemployed = ↑ tobacco use vs employed (66% vs 45%)*, ↑ high risk alcohol use vs employed (20% vs 19%) Alcohol use (high risk) = ↑ tobacco use (no statistics provided); tobacco use, aged 18-34yrs = ↑ cannabis use vs no tobacco use, aged 18-34yrs (46% vs 16%); tobacco use, aged 18-34, non-remote = ↑ illicit substance use vs no tobacco use in non-remote (no statistics provided) 1 st & 2 nd household income quartile = ↑ tobacco use vs 3rd+ quartile (55% vs 40%)*, 3rd+ quartile = ↑ high risk alcohol use vs 1 st & 2 nd quartile (18% vs 16%) Males in remote = ↑ daily tobacco use vs males in non-remote (58% vs 49%); remote = ↑ alcohol abstinence vs non-remote (18% vs 6%)
ABS (2009)	Community	Remote = ↑ tobacco use vs living in major city (OR=1.58, CI 0.88-2.83)*, ↑ alcohol abstinence (12mths) vs living in major city (OR=1.85, CI 1.01-3.36)*; Regional = ↑ high risk alcohol use vs remote (OR=1.41, CI 0.46-4.29)*, major city (OR=1.80, CI 0.59-5.46)*
ABS (2016)	Individual Community	Males = ↑ daily tobacco use vs females (OR=1.24, CI 1.22-1.25)*, ↑ single occasion risky alcohol use vs females (OR=2.40, CI 2.37-2.43)*, ↑ lifetime risky alcohol use vs females (OR=3.31, CI 3.25-3.37)* ↑ illicit substance use vs females (OR=1.32, CI 1.30-1.33)*, ↑ analgesic use vs males (15% vs 11%); males 15-24yrs = ↑ daily tobacco use vs females 15-24yrs (OR=1.46, CI 1.43-1.50)*; males 45-54yrs = ↑ daily tobacco use vs females 45-54yrs (OR=1.47, 1.42-1.51)*; females = ↑ alcohol use (<1 day/yr) vs males (47% vs 29%) Remote = ↑ daily tobacco use vs non-remote (OR=1.54, CI 1.52-1.57)*, ↑ single occasion risky alcohol use vs non-remote (OR=1.12, CI 1.10-1.13)*, ↑ lifetime risky alcohol use vs non-remote (OR=1.37, CI 1.34-1.39)*; non-remote = ↑ illicit substance use vs remote (OR=1.90, CI 1.87-1.94)*
Brown <i>et al.</i> (2016)	Individual	Completed less than yr12 = ↑ tobacco use vs completed yr12 (OR=2.70, CI 1.05-6.94)*; diploma/degree (OR=7.74, CI 1.70-35.27)**; completed less than yr12 = ↑ cannabis use vs completed yr12 (OR=5.43, CI 1.51-19.50)*, certificate/traineeship (OR=1.94, CI 1.04-3.60)*, diploma/degree (OR=6.66, CI 1.45-30.50)** Unemployed = ↑ tobacco vs employed (OR=3.31, CI 1.96-5.58)**; ↑ cannabis use vs employed (OR=3.43, CI 1.87-6.32)***

First author (year)	Findings Ecological level	Specific results
	Relationship	<p>Age of mother at birth of first child is 14-19yrs = ↑ tobacco use vs mother aged 20-24yrs (OR=1.76, CI 1.02-3.04)*; mother aged 25yrs+ (OR=2.92, CI 1.37-6.19)**; ↑ cannabis use vs mother aged 20-24yrs (OR=2.58, CI 1.35-4.94)*; mother aged 25yrs+ (OR=3.20, CI 1.35-7.63)**</p> <p>3+ stressful events and social health issues = ↑ tobacco use vs 1-2 stressful events and social health issues (OR=2.20, CI 1.16-4.16)*; ↑ cannabis use vs 0 stressful events and social health issues***; 1-2 stressful events and social health issues (OR=4.19, CI 1.81-9.70)***</p> <p>First pregnancy check-up in 2nd trimester = ↑ cannabis use vs first pregnancy check-up in 1st trimester (OR=3.46, CI 1.64-7.30)*</p> <p>Problems with drugs or alcohol = ↑ tobacco use vs no problems with drugs or alcohol (OR=5.71, CI 1.16-28.06)***; ↑ cannabis use vs no problems with drugs or alcohol (OR=36.17, CI 8.17-160.14)***</p> <p>Mother has 4-10 children = ↑ tobacco use vs mother has 1 child (OR=2.78, CI 1.43-5.39)*; mother has 2-3 children (OR=1.52, CI 0.78-2.98)*; ↑ cannabis use vs mother has 1 child (OR=2.67, CI 1.15-6.17)*</p> <p>Partner has problems with drugs/alcohol = ↑ tobacco use vs partner does not have problems with drugs/alcohol (OR=1.99, CI 1.01-3.93)*; ↑ cannabis use vs partner does not have problems with drugs/alcohol (OR=6.44, CI 3.21-12.90)***</p> <p>Ever been pushed, shoved or assaulted = ↑ cannabis use vs never been pushed, shoved or assaulted (OR=3.24, CI 1.56-6.70)**; ever scared by other people's behavior = ↑ cannabis use vs not scared by other people's behavior (OR=3.12, CI 1.70-5.72)***</p> <p>Upset by family arguments = ↑ cannabis use vs not upset by family arguments (OR=2.61, CI 1.41-4.84)**; left home because of an argument or fight = ↑ cannabis use vs have not left home because of an argument or fight (OR=2.25, CI 1.22-4.16)*</p> <p>Ever been pestered for money = ↑ tobacco use vs not pestered for money (OR=2.28, CI 1.30-4.00)***; ↑ cannabis use vs not pestered for money (OR=4.19, CI 2.25-7.78)***</p>
Clough <i>et al.</i> (2004)	Individual	<p>Males = ↑ lifetime cannabis use vs females (OR= 7.40)***</p> <p>Cannabis use = ↑ history of petrol sniffing vs no cannabis use (OR= 9.10)***; ↑ tobacco use vs no cannabis use (OR= 19.00)***; ↑ kava use vs no cannabis use (OR= 0.40)*</p>
Cunningham <i>et al.</i> (1997)	Individual	<p>Still attending school = ↓ tobacco use vs completed yr10/11 (males OR=0.19, CI=0.13-0.29)***; (females OR=0.31, CI 0.22-0.43)***; completed yr12 = ↓ tobacco use vs completed yr10/11 (males OR=0.37, CI 0.28-0.49)***; (females OR=0.56, CI 0.44-0.71)***</p> <p>Employed in CDEP scheme = ↑ tobacco use vs employed in non-CDEP (males OR=1.95, CI 1.51-2.52)***; (females OR=1.43, CI 1.04-1.97)*; unemployed = ↑ tobacco use vs employed in non-CDEP (males OR=1.89, CI 1.56-2.28)***; (females OR=1.63, CI 1.32-2.03)***; not in labor force = ↑ tobacco use vs employed in non-CDEP (males OR=1.74, CI 1.41-2.14)***; (females OR=1.69, CI 1.42-2.01)***</p> <p>Home owner/purchaser = ↓ tobacco use vs not a home owner/purchaser (males OR=0.40, CI 0.34-0.49)***; (females OR=0.55, CI 0.46-0.67)***; live with Aboriginal and Torres Strait Islander and non-Aboriginal people = ↑ tobacco use vs only live with Aboriginal and Torres Strait Islander people (males OR=1.44, CI 1.20-1.72)***</p> <p>15-24yrs = ↓ tobacco use vs 25-44yrs (Aboriginal males OR = 0.82, CI 0.69-0.98)*; 45yrs+ = ↓ tobacco use vs 25-44yrs (males OR = 0.56, CI 0.46-0.69)***; (females OR = 0.48, CI 0.40-0.58)***</p>
	Community Cultural	<p>Last drank more than 1wk ago = ↓ tobacco use vs drank in the past week (males OR = 0.63, CI 0.54-0.74)***; (females OR = 0.40, CI 0.34-0.47)***; never drinks alcohol = ↓ tobacco use vs drank in the past week (males OR = 0.20, CI 0.16-0.26)***; (females OR = 0.16, CI 0.13-0.19)***</p>
	Societal	<p>Main language is not English = ↑ tobacco use vs English as main language (males OR=1.31, CI 1.05-1.63)*; ↓ tobacco use vs English as main language (females OR=0.74, CI 0.60-0.90)**</p> <p>Urban area = ↓ tobacco use vs capital city (males OR = 0.78, CI 0.65-0.94)**; (females OR =0.76, CI 0.65-0.90)**; rural area = ↓ tobacco use vs capital city (females OR = 0.76, CI 0.63-0.93)**</p> <p>Role of Elders considered not important = ↓ tobacco use vs considers Elders important (males OR=0.66, CI 0.54-0.81)***; (females OR=0.81, CI 0.66-0.98)*; does not recognize homelands = ↓ tobacco use vs recognizes homelands (females OR=0.76, CI .64-0.98)***</p> <p>Taken away from family as child = ↑ tobacco use vs not taken away from family as child (males OR=1.88, CI 1.43-2.49)***; (females OR=1.37, CI 1.08-1.75)**</p>
DiGiacomo <i>et al.</i> (2007) ^b	Individual	<p>↑ Stress = ↑ tobacco use relapse (no statistics provided)</p>
Dingwall <i>et al.</i> (2012)	Relationship	<p>Married = ↑ petrol abstinence vs unmarried*; friend encouragement to receive treatment = ↑ petrol abstinence*</p>
	Community	<p>↑ Number of people living in house = ↑ petrol abstinence*</p> <p>Remote = ↑ petrol abstainer's vs non-remote*</p>

First author (year)	Findings Ecological level	Specific results
Fitts <i>et al.</i> (2013)	Individual Community	Petrol accessibility = ↑ petrol sniffing relapse vs limited petrol accessibility (RR= 1.70)* 40yrs+ = ↓ repeat drink driving offences vs 15-24 yrs (OR= 0.73, CI 0.57-0.91)** Inner regional = ↑ repeat drink driving offences vs major city (OR= 1.97, CI 1.47-2.63)***; outer regional = ↑ repeat drink driving offences vs major city (OR= 2.10, CI 1.63-2.71)***; remote = ↑ repeat drink driving offences vs major city (OR= 2.53, CI 1.88-3.39)***; very remote = ↑ repeat drink driving offences vs major city (OR=2.71, CI 2.04-3.61)***
Fitts <i>et al.</i> (2017)	Individual Community	Males = ↑ repeat drink driving offences vs females (OR= 2.35, CI 1.77-3.1)*** 14-17yrs = ↑ repeat drink driving offences vs 21-24 yrs (OR= 4.44, CI 3.10-6.38)***; 18-20 years = ↑ repeat drink driving offences vs 21-24 yrs (OR= 2.36, CI 1.71-3.26)*** Inner regional = ↑ repeat drink driving offences vs major city (OR= 1.67, CI 1.15-2.45)**
Gazis <i>et al.</i> (2010) _b	Relationship Cultural	Peer tobacco use = ↑ tobacco use vs non-user peers (OR= 1.60, CI 1.2-2.1)***; peer alcohol use = ↑ alcohol use vs non-user peers (OR= 1.40, CI 1.2-1.7)**; peer cannabis use = ↑ cannabis use vs non-user peers (OR= 1.40, CI 1.0-2.0)* ↑ Time spent learning about Aboriginal and Torres Strait Islander culture = ↑ tobacco use *; high scores for cultural participation & exploration + peer alcohol use = ↓ alcohol abstinence vs no peer alcohol use (OR=0.80, CI 0.7-1.0)*; high scores for cultural affirmation & belonging + peer alcohol use = ↓ alcohol abstinence vs no peer alcohol use (OR=0.80, CI 0.7-1.0)*; high scores for cultural participation & exploration + no peer alcohol use = ↓ alcohol initiation vs peer alcohol use (OR=0.80, CI 0.7-0.9)**; high scores for cultural affirmation & belonging + no peer AOD use = ↓ alcohol initiation vs peer alcohol use (OR=0.80, CI 0.7-0.9)**; high scores for cultural affirmation & belonging + no peer cannabis use = ↓ cannabis use vs no peer cannabis use (OR=-0.07, CI 0.5-1.0)*; strong MEIM scores = ↓ alcohol initiation vs low MEIM scores (OR= -0.90, CI 0.8-0.9)**
Hall <i>et al.</i> (1993)	Individual	Males = ↑ alcohol use vs females (OR=3.17, CI 2.21-4.56)*** Males ≤ 40yrs = ↑ alcohol use vs >41yrs (OR=18.87, CI 7.28-48.85)***; females ≤ 40yrs = ↑ alcohol use vs >41yrs (OR=5.17, CI 2.93-9.11)*
Heath <i>et al.</i> (2006)	Individual Relationship	↑ Boredom = ↑ tobacco use for 11% of sample ↑ Stress = ↑ tobacco use in 57% of sample ↑ Drinking alcohol = ↓ tobacco cessation for 8% of sample; eating a meal associated with ↑ tobacco use for 42% of sample Family/peer tobacco use = ↑ tobacco use for 17% of sample
Jacups <i>et al.</i> (2015)	Individual Relationship Societal	Left school in yr7/8 = ↑ cannabis use vs left school in yr11/12 (OR=5.56, CI 1.37-22.59)**; left school in yr9/10 = ↑ cannabis use vs left school in yr11/12 (OR=3.97, CI 1.68-9.37)**; ↓ mean age left school = ↑ cannabis use * Unemployed/boredom = ↑ cannabis use (33% sample); ↑ workplace outputs, retain job = ↑ cannabis cessation (15% sample) ↑ Stress (grief, physical pain) = ↑ cannabis use in 34% of sample Health prioritization = ↑ cannabis cessation in 18% of sample Substance dealing = ↑ cannabis use in 3% of sample Legal problems as juvenile = ↑ cannabis use vs no legal problems as juvenile (OR=4.27; CI 1.71-10.66)**; incarceration, parole conditions, family services = ↑ cannabis cessation for 29% of sample Positive social change = ↑ cannabis cessation for 26% of sample Family, peer, work colleague substance use influence = ↑ cannabis use in 30% of sample ↓ Cannabis supply/no money = ↑ cannabis cessation in 13% of sample
Lee <i>et al.</i> (2009) _b	Individual	Past petrol sniffing = ↑ cannabis use vs no petrol sniffing (OR= 3.90, 1.02-15.62)*, ↑ heavy cannabis use vs no petrol sniffing (OR= 4.40, 1.21-15.80)*
Maddox <i>et al.</i> (2015) _a	Individual Relationship	Did not complete yr 12 = ↑ tobacco use vs completed yr 12 (OR=21.50, CI 2.91-158.70)**; ↓ SES = ↑ tobacco use (no statistics provided) Friends, family do not smoke = ↑ tobacco abstinence vs peer tobacco use (OR=5.40, CI 1.5-19.1)*; ↑ number of housemates who smoke = ↑ tobacco use (OR=11.80, CI 1.05-132.18)*
Maksimovic <i>et al.</i> (2013)	Individual	Part-time work = ↑ tobacco cessation * Tobacco use reported as a big expense = ↑ quit using tobacco (no statistics provided) ↓ Emotional well-being = ↑ tobacco use * Health prioritization = ↑ tobacco cessation for 50% of quitters Tobacco use reported as "not their thing" = quit using tobacco (no statistics provided)

First author (year)	Findings Ecological level	Specific results
	Relationship	Falling pregnant = quit using tobacco (no statistics provided) Supportive environment = ↑ tobacco abstinence / cessation* ; positive role models = quit using tobacco (no statistics provided) Family death = quit using tobacco (no statistics provided); shame = quit using tobacco (no statistics provided) Live with a smoker = ↑ tobacco use vs do not live with a smoker (OR=13.71, CI 3.73-50.39)**
Noble <i>et al.</i> (2015)	Individual	Unemployed = ↑ substance use vs employed (OR= 2.82, CI not specified)* Males = ↑ substance use vs females (OR= 3.11, CI not specified)** 55yrs+ = ↓ substance use vs younger than 55yrs (OR= 0.17, CI not specified)** Ever exposed to violence = ↑ substance use vs never exposed to violence (OR= 30.87, CI not specified)**
Passey <i>et al.</i> 2014	Individual	Completed less than yr10 = ↑ 2-3 substances use vs completed yr10-11 (OR=3.08, CI 1.52-6.21)*, completed yr12 (OR=11.99, CI 3.27-43.99)*; did not complete post-secondary education = ↑ multiple substances use vs completed post-secondary education (OR=2.81, CI 1.41-5.57)* Tobacco use initiation <15yrs old = ↑ multiple substances use vs tobacco use initiation ≥15yrs old (OR=4.04, CI 1.71-9.58)*; never smoked tobacco (OR=213.46, CI 26.89-1694.61)***, ↑ single substance use vs never smoked tobacco (OR=9.62, CI 3.49-26.53)***; alcohol use initiation <15yrs old = ↑ multiple substances use vs alcohol use initiation ≥15yrs old (OR=4.92, CI 1.90-12.77)*; never drunk alcohol (OR=13.53, CI 4.94-37.07)***; cannabis use initiation <15yrs old = ↑ multiple substances use vs never smoked cannabis (OR=12.93, CI 4.99-33.54)***
	Community	Live in New South Wales = ↑ dual substance use vs live in Northern Territory (OR=2.88, CI 1.43-5.78)**
Passey <i>et al.</i> 2012	Individual	Completed less than yr10 = ↑ tobacco use vs completed yr10-11 (OR=2.12, CI 1.19-3.75)*, completed yr12 (OR=3.58, CI 1.65-7.79)**; no post-secondary education = ↑ tobacco use vs post-secondary education (OR=1.79, CI 1.08-2.95)*
Smirnov <i>et al.</i> (2016)	Individual	Unemployed = ↑ methamphetamine and opioid dual dependence vs employed (RR= 8.98, CI 2.25-35.82)** Psychological distress = ↑ opioid dependence vs no psychological distress (RR= 2.67, CI 1.09-6.53)*, ↑ methamphetamine and opioid dual dependence vs no psychological distress (RR= 4.86, CI 2.08-11.34)*** Incarcerated more than once = ↑ opioid dependence vs never incarcerated (RR= 3.70, CI 1.32-10.41)*, ↑ methamphetamine and opioid dual dependence vs never incarcerated (RR= 3.78, CI 1.43-9.97)**
Thomas <i>et al.</i> (2008)	Individual	Completed yr 11/12 or non-school qualification = ↑ tobacco abstinence vs completed yr 10 or below (OR=1.60, CI 1.36-1.89)*** Unemployed or CDEP = ↓ tobacco abstinence vs not in labor force (OR= 0.76, CI 0.61-0.94)*; employed in public or private sector = ↑ tobacco abstinence vs not in labor force (OR= 2.03, CI 1.64-2.52)*** No financial stress (could raise \$2,000 within a week) = ↑ no tobacco use vs high financial stress (could not raise \$2,000 within a week; (OR= 2.33, CI 1.94-2.79)***; 2 nd income quintile = ↑ tobacco abstinence vs lowest income quintile (OR= 1.49, CI 1.20-1.85)***; 3 rd /4 th /highest income quintile = ↑ tobacco abstinence vs lowest income quintile (OR= 2.50, CI 1.96-3.18)***; not receiving Govt. pensions = ↑ tobacco abstinence vs receiving Govt. cash pensions (OR= 2.52, CI 2.09-3.03)*** House maintenance/repairs not carried out in last 12mths = ↓ no tobacco use vs no house maintenance (OR= 0.81, CI 0.67-0.99)*; lived in 2+ dwellings in last 12 mths = ↓ no tobacco use vs lived in one dwelling (OR= 0.67, CI 0.54-0.83)***; house owner/purchaser = ↑ tobacco abstinence vs house renter (OR= 2.87, CI 2.36-3.48)***; 1+ Aboriginal and Torres Strait Islander dependents 0-4yrs in household = ↓ tobacco abstinence vs no Aboriginal and Torres Strait Islander dependents 0-4yrs (OR= 0.79, CI 0.66-0.95)* Participated in sport in last 12mths = ↑ tobacco abstinence vs no sporting participation (OR= 1.49, CI 1.22-1.82)*** No access to vehicle = ↓ tobacco abstinence vs access to vehicle (OR= 0.50, CI 0.42-0.59)***; perceived difficulty with transport = ↓ tobacco abstinence vs perceived ease of transport (OR= 0.80, CI 0.66-0.96)*; not used computer in last 12mths = ↓ tobacco abstinence vs used computer in last 12mths n (OR= 0.45, CI 0.38-0.53)***; used internet in last 12mths = ↑ tobacco abstinence vs not used internet in last 12mths (OR= 2.35, CI 1.98-2.78)*** Psychological stressors not reported in last 12 months = ↑ no tobacco use vs stressors reported (OR= 1.30, CI 1.04-1.63)* Fair/poor health status = ↓ tobacco abstinence vs excellent/very health good status (OR= 0.72, CI 0.53-0.96)* Drank alcohol in past 2wks = ↓ tobacco abstinence vs no alcohol in past 2wks (OR= 0.44, CI 0.36-0.53)***; no alcohol in last 12mths = ↑ tobacco abstinence vs consumed alcohol in last 12mths (OR= 2.36, CI 1.90-2.94)***
	Relationship	Used legal service in last 12mths = ↓ tobacco abstinence vs did not use legal services in last 12mths (OR= 0.53, CI 0.43-0.66)***; arrested in last 5yrs = ↓ tobacco abstinence vs not arrested in last 5yrs (OR=0.40, CI 0.30-0.53)***; incarcerated in last 5yrs = ↓ tobacco abstinence vs not incarcerated in last 5yrs (OR= 0.35, CI 0.30-0.53)***

First author (year)	Findings Ecological level	Specific results
	Community Societal	Not involved in social activities in last 3mths = ↓ tobacco abstinence vs involved in social activities (OR= 0.72, CI 0.54-0.97)*; not have support in time of crisis = ↓ tobacco abstinence vs support (OR= 0.59, CI 0.42, 0.83)** Victim of physical or threatened violence in last 12mths = ↓ tobacco abstinence vs not a victim of physical or threatened violence (OR= 0.56, CI 0.45-0.69)*** Remote males = ↓ tobacco abstinence vs non-remote males (OR= 0.66, CI 0.54-0.80)*; remote = ↑ tobacco abstinence vs non-remote (OR= 1.25, CI 1.06-1.48)** Person removed from natural family = ↓ tobacco abstinence vs person removed from family (OR= 0.46, CI 0.32-0.66)***
Thrift <i>et al.</i> (2011)	Individual Community	Low SES = ↑ tobacco use during pregnancy vs high SES (OR= 2.64, CI 2.22-3.14)* Low SES rural = ↑ tobacco use during pregnancy vs high SES rural (OR= 1.54, CI 1.03-2.32)*; low SES urban = ↑ tobacco use during pregnancy vs high SES urban (OR= 2.69, CI 2.20-3.29)*
Qualitative n=13		
Bond <i>et al.</i> (2012)	Individual Relationship Community Societal	↑ Stress = ↑ tobacco use ; ↑ negative life events = ↑ tobacco use Personal health crisis = ↑ tobacco cessation ↓ Self-esteem = ↑ tobacco use ; ↑ positive self-concept, self-esteem, self-efficacy = ↑ tobacco cessation ; ↑ resilience strategies = ↑ tobacco cessation ; positive change in identity after major life milestone = ↑ tobacco cessation ; personal ownership/control over decision making process = ↑ tobacco cessation Positive life event = ↑ tobacco cessation Supportive environment = ↑ tobacco cessation ; health care provider as integral support person = ↑ tobacco cessation Negative social stigma about smoking = ↑ guilt = reinforced tobacco use Workplace where smoking behaviors are not supported implicitly or explicitly = ↑ tobacco abstinence/ cessation Westernized health promotion = continued tobacco use + ↑ tobacco prevalence within community . Symbolic of colonial assertions and power over Aboriginal and Torres Strait Islander people Promotion of increased risk of illness and premature death = no change in tobacco use . Aboriginal and Torres Strait Islander ill-health viewed as pre-determined reality
Dawson <i>et al.</i> (2012)	Individual Relationship Community Cultural Societal	↑ Grief and loss = continued tobacco use + obstacle to quitting smoking; ↑ stress = continued tobacco use + obstacle to quitting smoking; fear = continued tobacco use + obstacle to quitting smoking ↓ Knowledge of tobacco effects = continued tobacco use ; scarcity of resources for quitting smoking = continued tobacco use ↓ Support and no positive role models = ↑ tobacco use Pressure to quit smoking = feeling of being “picked on” = ↑ tobacco use ; unwanted attention (well-wishes) during quit attempt = reminds individual about tobacco = ↑ tobacco use relapse Social pressure to smoke = ↑ tobacco use Living with smokers = ↑ tobacco use Tobacco use accepted and common in the workplace = ↑ tobacco use ↓ Tobacco use = ↑ social exclusion = ↑ tobacco use to fit in Bush tobacco has pivotal role in traditional Aboriginal and Torres Strait Islander society = ↑ acceptability of tobacco use ↓ Smoke-free policies = barrier to quitting tobacco use ; ↓ short-term tobacco program funding = barrier to quitting tobacco use
Gamarania <i>et al.</i> (1998)	Individual Relationship	Perception that they are too young = ↑ no tobacco use ↑ Knowledge of adverse health effects = ↑ tobacco abstinence/cessation Enjoy smoking tobacco = ↑ tobacco use ; do not enjoy smoking tobacco = no tobacco use ; fear of getting in trouble = no tobacco use ; not wanting to become thin = no tobacco use Peer tobacco use = ↑ tobacco use ; peer pressure to smoke = ↑ tobacco use ; family does not smoke = no tobacco use
Gould <i>et al.</i> (2017)	Individual	Having one's own money = ↑ regular tobacco use Turning 18 years = ↑ tobacco use Cannabis use = ↑ tobacco use Pregnancy, feeling nauseous, breastfeeding = ↑ tobacco cessation Baby transitioning to bottle feeding = ↑ tobacco use relapse

First author (year)	Findings Ecological level	Specific results
	Relationship	Depression = ↑ tobacco use ; negative stressors = ↑ tobacco use Peer tobacco use = ↑ tobacco use relapse ; peer pressure to use tobacco = ↑ tobacco use ; parent tobacco use = ↑ tobacco accessibility = ↑ tobacco use Non-smoking mothers = ↑ tobacco abstinence
Johnston <i>et al.</i> (2008)	Individual	Unemployment = ↑ tobacco use ↓ SES = ↑ tobacco use ↑ Stress = ↑ tobacco use relapse , females > males ↑ Resilience and determination = ↑ tobacco abstinence Enjoy smoking tobacco = ↑ tobacco use
	Relationship	Positive family relationship = ↑ tobacco cessation ; positive role models (non-smoking parents, grandparents) = ↑ tobacco abstinence Exposure to family smoking practices = ↑ tobacco initiation ; model adult smoking behavior = ↑ tobacco initiation ; peer tobacco use = ↑ tobacco initiation ; partner tobacco use = ↑ tobacco initiation ; community tobacco use = ↑ tobacco initiation ; social pressure to smoke = ↑ tobacco use ↑ No. of smokers in house = ↑ tobacco use
	Cultural	Sharing tobacco as cultural ritual = sense of belonging and social cohesiveness = ↑ tobacco use ; smoking as behavior passed down through generations = ↑ tobacco use ; tobacco as commodity for social exchange = reinforces tobacco use ; observe general community using tobacco = tobacco use as socially acceptable = ↑ tobacco use ↑ Intergenerational trauma = breakdown of more traditional lifestyles = ↑ problem tobacco use Unregulated access to tobacco = ↑ tobacco use
Johnston <i>et al.</i> (2012)	Individual	Alcohol use = ↑ tobacco use ; cannabis use = ↑ tobacco use Portray an image of being “rebellious”, “cool”, or “grown up” = ↑ tobacco initiation ; smoking perceived as “gross” or “disgusting” = no tobacco use
	Relationship	Reinforcing messages from family/peers against tobacco use + negative physiological effects from first puff = ↑ tobacco cessation ; ↑ anti-smoking socialization = ↑ tobacco abstinence ; direct role models = ↑ tobacco abstinence ; clear and communicated consequences to smoking = ↑ tobacco abstinence Acquiring tobacco from family members = ↑ tobacco experimentation ; overt pressure to smoke from relative = ↑ tobacco experimentation ; social pressure to smoke during high school years = ↑ tobacco experimentation and use ; family networks teaching youth how to smoke (roll cigarette, ‘light up’) = ↑ tobacco initiation ; peer, community tobacco use = ↑ tobacco use ; not smoking around children = ↑ tobacco abstinence among those children
	Community	Live with a smoker = ↑ tobacco exposure and availability = ↓ tobacco use initiation age ; smoke-free indoor spaces within home = ↑ tobacco abstinence ↑ Tobacco availability in home = ↑ tobacco use Remote living = ↑ tobacco use
	Cultural	↓ Tobacco access = ↑ tobacco abstinence ; ↓ perceived tobacco prevalence = ↓ tobacco use in the community Smokers feel marginalized by the wider school community = seek out other smokers to normalize behavior = reinforce tobacco use = ↑ tobacco use intensity Share tobacco with relatives while socializing = reinforces behavior to smoke = ↑ tobacco use ; high prevalence of tobacco among families = tobacco normalization = ↑ tobacco experimentation ; in remote settings, smoking in families is normative = ↑ tobacco use ; peer socialization = indirect pressure to conform to social norms = ↑ tobacco experimentation
	Societal	↑ Tobacco restrictions (smoke-free areas, graphic pack warnings) = ↓ tobacco use
Leavy <i>et al.</i> (2010)	Individual	↑ Boredom = ↑ tobacco use Chronic problems in life = ↑ tobacco use ; ↑ stress = ↑ tobacco use
	Relationship	Peer tobacco use = ↑ tobacco use ; peer pressure to smoke = ↑ tobacco use
	Cultural	Tobacco experimentation as normal part of some teenager’s trajectory = ↑ tobacco experimentation
MacLean <i>et al.</i> (2017)	Individual	Trauma through other substance use = ↑ crystal methamphetamine use
	Relationship	Trauma through family conflict = ↑ crystal methamphetamine use Enjoy the social experience of using with other people = ↑ crystal methamphetamine use Desire to reconnect with family = ↑ crystal methamphetamine cessation
	Community	↓ Social opportunities in regional communities = ↑ crystal methamphetamine use

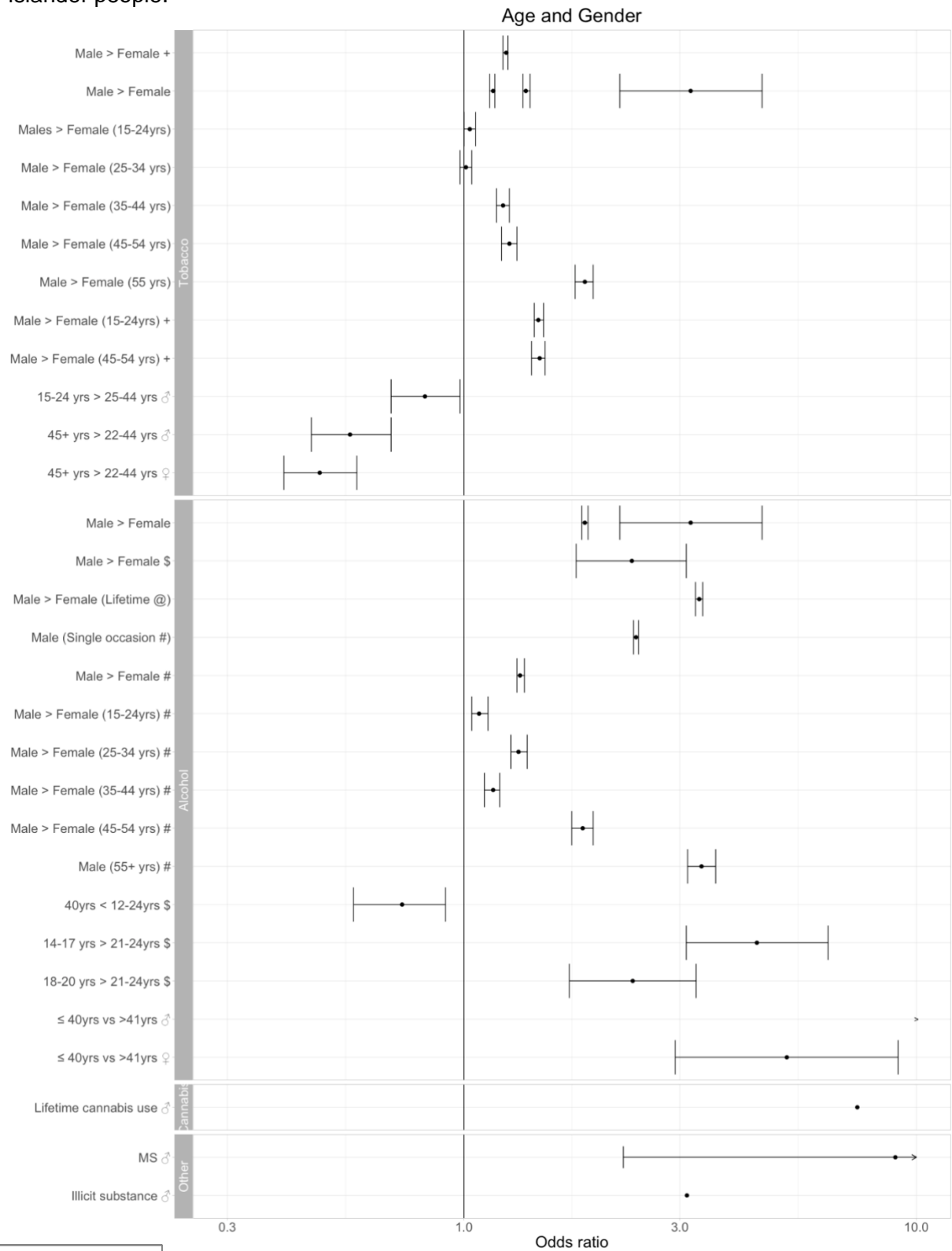
First author (year)	Findings Ecological level	Specific results
	Cultural Societal	<p>↓ Recreational options = ↑ crystal methamphetamine use</p> <p>Selling crystal methamphetamine = ↑ availability = ↑ crystal methamphetamine use</p> <p>↑ Connection to culture and to Country = ↑ crystal methamphetamine cessation</p> <p>↑ Intergenerational trauma = ↑ crystal methamphetamine use</p> <p>↑ Punitive social policies towards Aboriginal people = ↑ crystal methamphetamine use</p> <p>↑ Racism towards Aboriginal people = ↑ crystal methamphetamine use</p> <p>↑ Social disadvantage towards Aboriginal people = gangs target Aboriginal people to commence dealing = ↑ availability = ↑ crystal methamphetamine use</p>
Maddox <i>et al.</i> (2015) ^a	Community Cultural	<p>↓ Awareness and access to smoking cessation services = ↑ tobacco use (no statistics provided)</p> <p>Normalization of tobacco use among Aboriginal people = ↑ tobacco use (no statistics provided)</p> <p>↑ tobacco availability = ↑ tobacco use (no statistics provided)</p>
Passey <i>et al.</i> (2011)	Individual Relationship Community Cultural Societal	<p>Success in school = ↓ tobacco early initiation; completed above year 10 = ↓ tobacco early initiation</p> <p>Lack of routine among unemployed adolescents = ↑ tobacco initiation</p> <p>↓ Opportunities = ↑ boredom = ↑ tobacco initiation; ↑ Sport and recreational activities = ↓ tobacco use</p> <p>Smoking symbolic of 'adult behavior' for females = ↑ tobacco initiation</p> <p>↑ Stress = ↑ tobacco use</p> <p>Portray an image of being "cooler", or "grown up" = ↑ tobacco initiation</p> <p>Positive non-smoking role models = ↓ tobacco initiation; ↑ anti-smoking parental advice = ↓ tobacco initiation</p> <p>Peer, family tobacco use = ↑ tobacco initiation; desire to fit in with friends and belong to group = ↑ tobacco initiation; ↑ non-smoking friends who disapproved of smoking = ↓ tobacco initiation</p> <p>Large and fluid households with people coming and going + shared child-raising + high smoking prevalence among members = ↑ tobacco initiation among youth</p> <p>↑ Tobacco availability = ↑ tobacco use</p> <p>Cultural obligation to accept and share tobacco (contributes to sense of belonging) = ↑ tobacco use; ↑ prevalence of tobacco use in Aboriginal and Torres Strait Islander networks = ↑ perception that tobacco use is normal and part of Aboriginal identity = ↑ tobacco use; ↑ prevalence of tobacco use in Aboriginal and Torres Strait Islander networks = ↑ perception that tobacco use is normal and part of Aboriginal identity = ↑ tobacco use; tobacco use expected as normal part of teenager's trajectory = ↑ tobacco experimentation</p> <p>↑ Intergenerational trauma = ↑ tobacco use</p>
Senior <i>et al.</i> (2006)	Individual Relationship Community	<p>↑ Boredom = ↑ petrol sniffing</p> <p>↑ Inner conflict from living between two cultures = ↑ petrol use</p> <p>Peer pressure to sniff petrol = ↑ petrol sniffing, remote/rural > non-remote</p> <p>Overcrowded housing = ↓ privacy = ↑ petrol sniffing</p> <p>Opal fuel introduction = ↑ petrol sniffing cessation</p>
Tsourtos <i>et al.</i> (2015)	Individual Relationship Cultural	<p>↑ Education level = ↑ tobacco abstinence</p> <p>↑ Stress = ↑ tobacco use, ↑ tobacco use relapse; ↑ distractions, distancing self from stressor = ↓ perceived level of stress = ↑ tobacco abstinence; ↑ problem solving skills, making decisions = ↑ ability to remove stressor = ↑ tobacco abstinence</p> <p>Transition point in life (often health related) = ↑ tobacco cessation</p> <p>↑ Determination, resoluteness, confidence, being in control, self-respect attributes = ↑ tobacco cessation; ↑ problem solving, making decisive decisions (to remove stressors) = ↑ tobacco abstinence</p> <p>Supportive environment (friends/family/community) = ↑ tobacco cessation</p> <p>Encouragement from others to smoke = ↑ tobacco use</p> <p>↑ Tobacco use as social norm = ↑ tobacco use</p>
Wood, <i>et al.</i> (2008)	Individual	<p>Unemployment = ↑ tobacco use, ↑ mental and physical occupation = ↑ tobacco abstinence/ cessation</p> <p>↑ Stress and difficult life circumstances = ↑ tobacco use, ↑ tobacco use relapse</p>

First author (year)	Findings Ecological level	Specific results
		Smoking is a low health priority = ↑ tobacco use
	Relationship	Teenage pregnancy = ↑ tobacco use ; single motherhood = ↑ tobacco use Supportive environment (family/peers) = ↑ tobacco abstinence/ cessation Yarning = ↑ tobacco use ; peer, community tobacco use = ↑ tobacco use
	Cultural	Smoking seen as normal and accepted behaviors = ↑ tobacco use , ↓ tobacco cessation efforts , ↑ tobacco rations provided during colonization = ↑ number of Aboriginal and Torres Strait Islander tobacco users = ↑ normalization of tobacco use = ↑ continued prevalence of tobacco use

* $p < 0.05$, 95% confidence interval, ** $p < 0.01$, *** $p < 0.001$, a Maddox et al. 2015 reported both quantitative and qualitative data, b longitudinal study. OR:

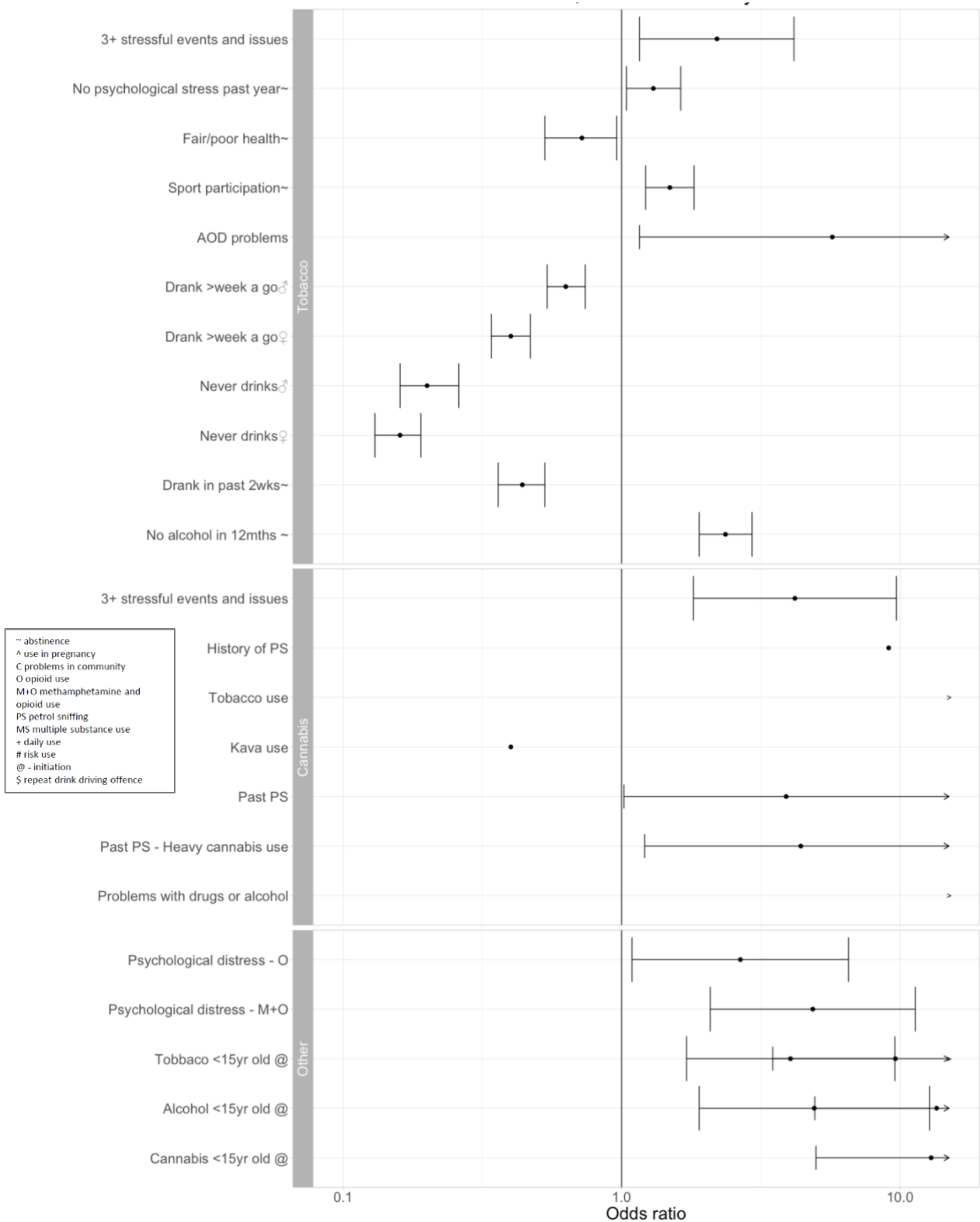
odds ratio; RR: risk ratio; SES: socio-economic status; NR: not reported; CDEP: Community development employment programs

Supplementary Figure 1a: Odds ratios of age and gender associated with tobacco, alcohol, cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.

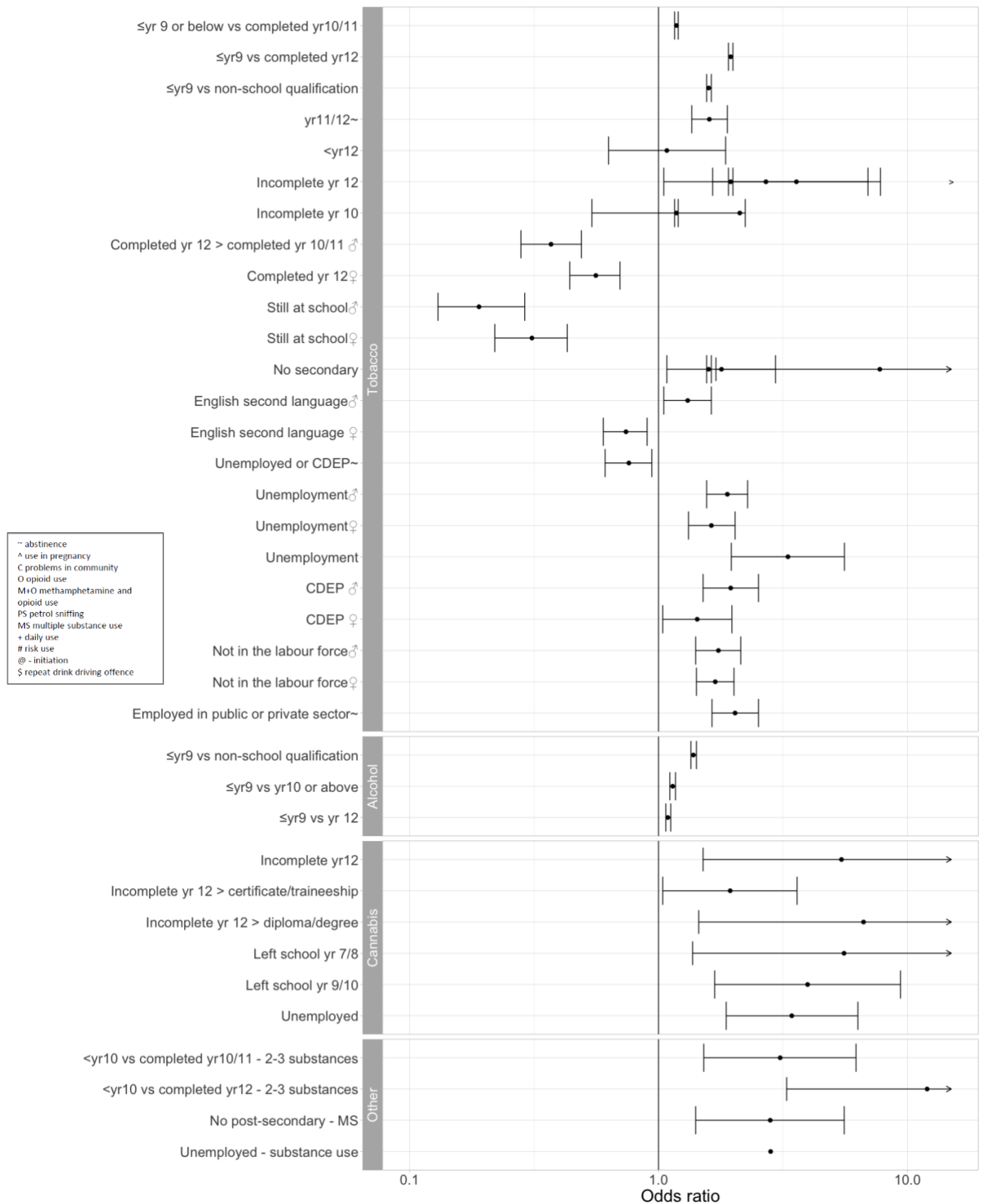


~ abstinence
 ^ use in pregnancy
 C problems in community
 O opioid use
 M+O methamphetamine and opioid use
 PS petrol sniffing
 MS multiple substance use
 + daily use
 # risk use
 @ - initiation
 \$ repeat drink driving offence

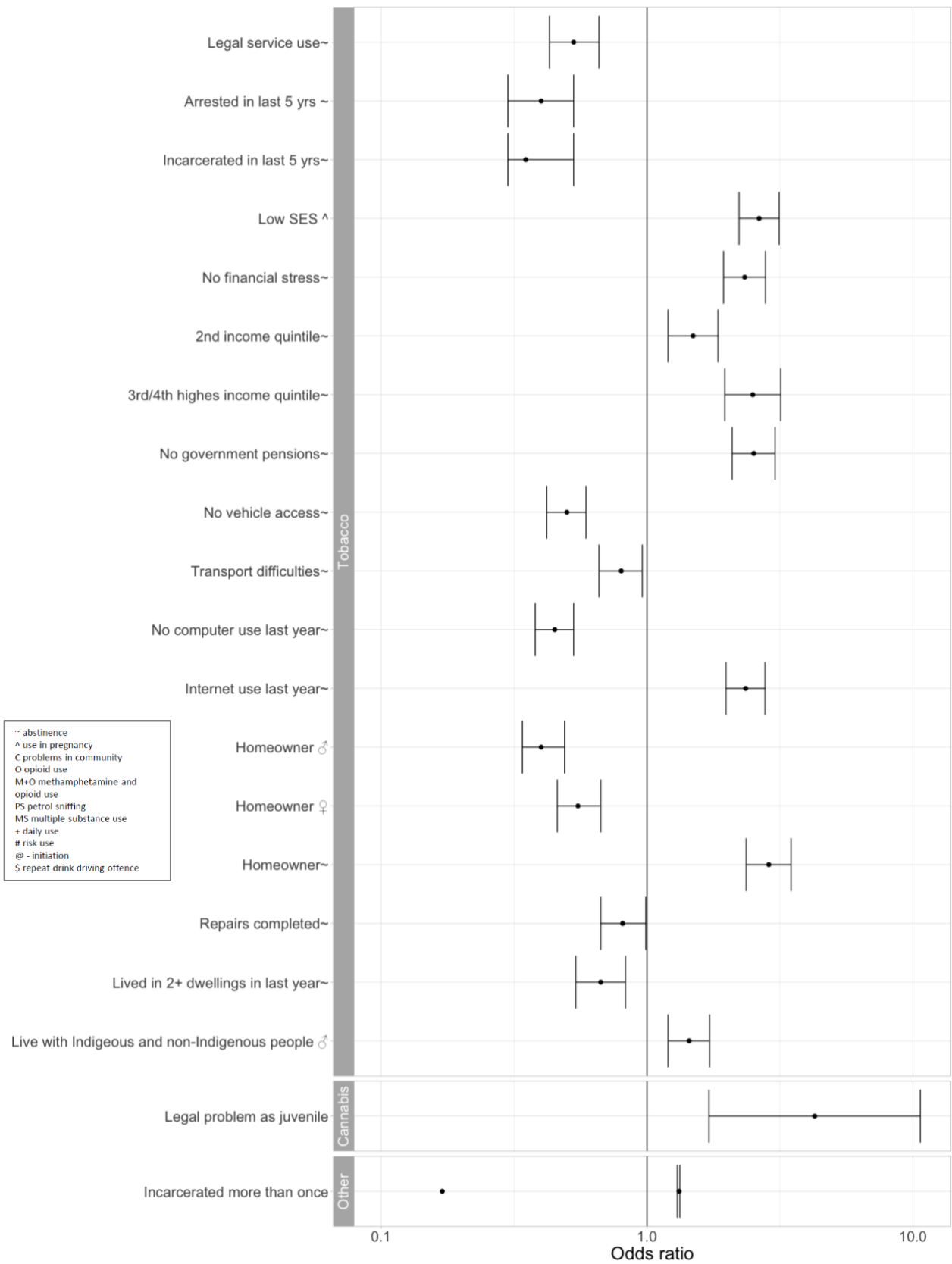
Supplementary Figure 1b: Odds ratios of mental and physical health and lifestyle factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.



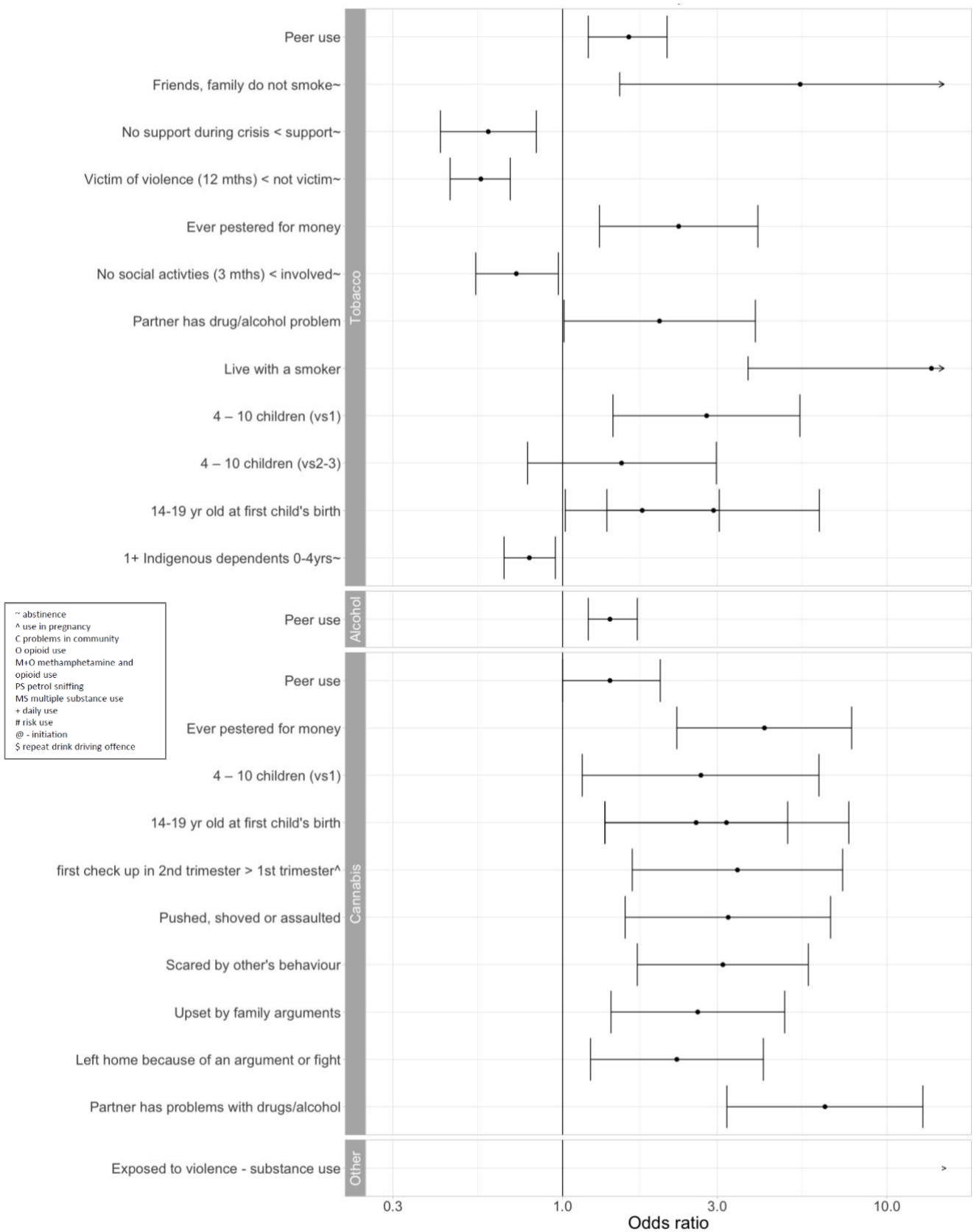
Supplementary Figure 1c: Odds ratios of education and employment factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.



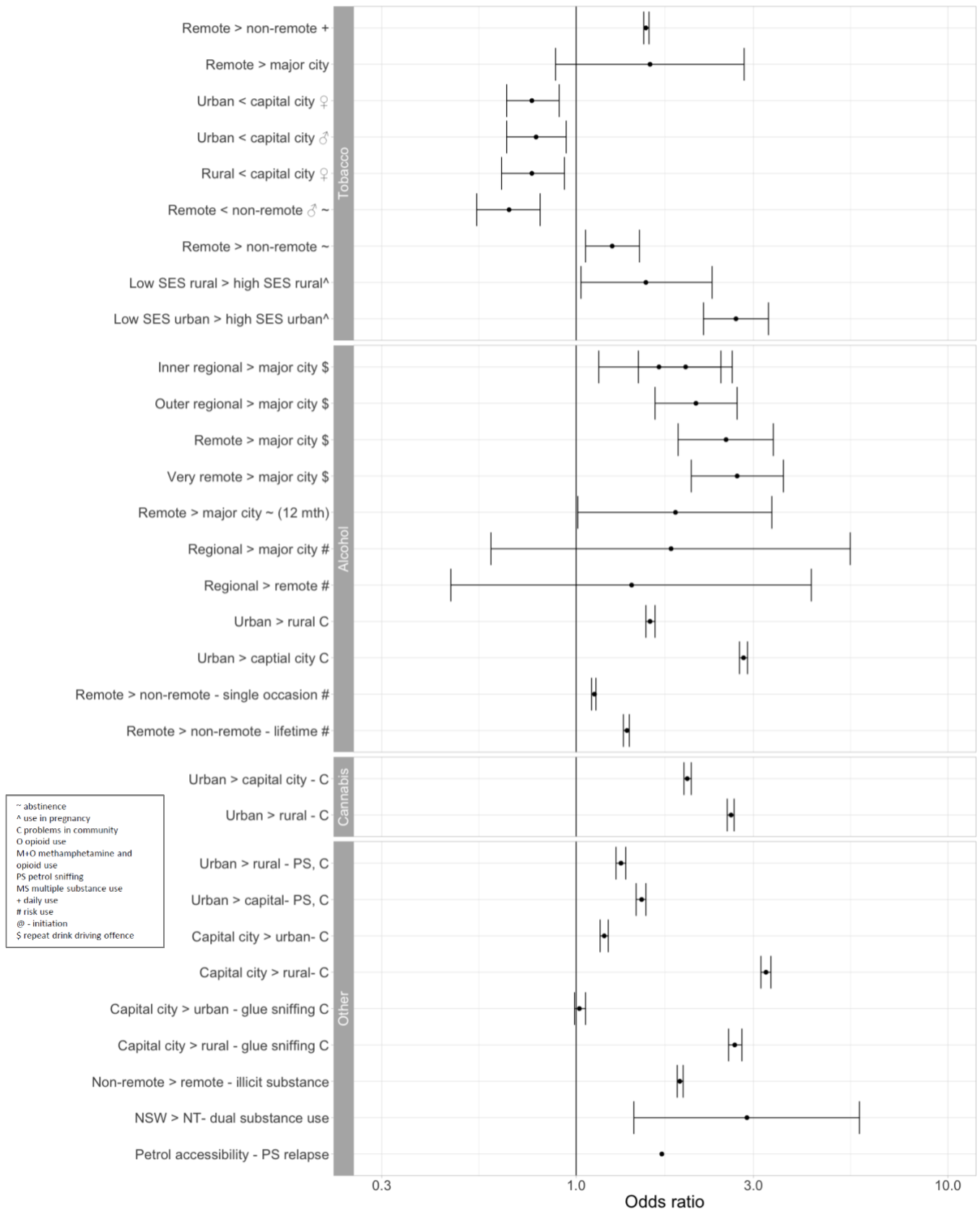
Supplementary Figure 1d: Odds ratios of other socioeconomic status factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.



Supplementary Figure 2: Odds ratios of relationship factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people



Supplementary Figure 3: Odds ratios of community factors associated with tobacco, alcohol cannabis and other substance use and related harms amongst Aboriginal and Torres Strait Islander people.



Supplementary Figure 4: Odds ratios of culturally distinct and societal factors associated with tobacco and alcohol use and related harms amongst Aboriginal and Torres Strait Islander people.

