



# Addressing injecting related risks among people who inject both opioids and stimulants: Findings from an Australian survey of people who inject drugs

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## ABSTRACT

**Background:** Opioids and stimulants are the most commonly injected illicit drugs worldwide and in Australia. While some people who inject drugs (PWID) prefer either opioids or stimulants, others regularly use both opioids and stimulants. Limited available research indicates that those who use opioids and stimulants together, either in combination or alternating between the two, may engage in injection-related practices which potentially place them at greater health risk and could lead to poorer health outcomes.

**Methods:** Participants were recruited nationally through member organizations of the Australian Injecting and Illicit Drug Users League (AIVL); these organizations represent PWID in each Australian state and territory. This study compared a sample of PWID (N = 535) who reported past-month injection of opioids only (N = 173), stimulants only (N = 208), or both (N = 154) on a range of health and wellbeing outcomes. PWID completed a survey assessing drugs injected, frequency of injecting, receptive equipment sharing, psychological distress, self-reported hepatitis C (HCV) status, experienced and internalized stigma, drug use salience, and community attachment.

**Results:** People who injected both opioids and stimulants reported more frequent injecting, more experiences of stigma, and greater reported HCV diagnosis than people who injected stimulants or opioids alone. They also showed greater attachment to a community of PWID and greater salience of drug use to their identity.

**Conclusions:** The findings of increased injecting and broader harms associated with injecting both stimulants and opioids are important for tailoring harm reduction and intervention designs for people who use both opioid and stimulant drugs, including prioritizing peer-based approaches.

## 1. Introduction

In 2016, it was estimated that there were 77,270 people who inject drugs (PWID) in Australia, a population prevalence of 0.4% (Kwon et al., 2019). About half are reported to inject at least daily; more frequent injecting is associated with greater harms including overdose, blood borne virus (BBV) transmissions, and soft tissue infection (Colledge et al., 2020). Receptive needle-syringe sharing increases the likelihood of BBV transmission and is associated with higher injecting frequency (Boodram, Mackesy-Amity, & Latkin, 2015; Wodak & Cooney, 2006). Recent data from the Australian Needle and Syringe Program Survey, collected from 1,324 attendees of 38 sites across Australia (excluding Victoria due to COVID-19 restrictions), indicates that HIV

seroprevalence continues to be very low at 2.5%, but hepatitis C (HCV) seroprevalence is much higher at 39% (Heard, Iversen, & Maher, 2021). Receptive sharing of needles and syringes is reported by approximately 16% and sharing of supplementary injecting equipment (e.g. spoons, filters, tourniquets) by 30% of the sample (Heard et al., 2020, 2021).

It is estimated that globally 83% of PWID inject mainly opioids (e.g., heroin) and 33% inject mainly stimulants (e.g., methamphetamines) with an overlapping number who inject both (Degenhardt et al., 2017). While the majority of PWID may prefer either an opioid or stimulant as their main drug of choice, there are a number who use both regularly (Darke & Hall, 1995; Palmer et al., 2021). There is little research on the injection use of opioids and stimulants, but what literature is available suggests that those who use both tend to engage in greater risk behaviors

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and be disproportionately impacted by adverse mental and physical health outcomes (Booth et al., 2008; Serota, Bartholomew, & Tookes, 2020; Wang, Li, & Zhi-min, 2017; Wang, Min, et al., 2017). In particular, the dual use of opioids and stimulants is more common among people who are younger, living in unstable housing or are experiencing homelessness, and is associated with injecting more frequently, shared use of injecting equipment, injecting in a jugular vein and increased overdose risk (Al-Tayyib, Koester, Langegger, & Raville, 2017; Glick et al., 2018, 2021; Palmer et al., 2021). Additionally, hospitalised people who use both opioids and stimulants have been found to have the highest rates of endocarditis and HCV, and are more likely to engage in discharge against medical advice than those using opioids only (Serota et al., 2020).

Motivations for dual opioid and stimulant use may be to increase pleasure, prevent withdrawal and manage comedowns (Palmer, Scott, Dietze, & Higgs, 2020). While polydrug use is common (Darke & Hall, 1995) and self-substitution of illicit substances is primarily a result of availability and costs of drug of choice as well as curiosity to try something new (Shapira et al., 2021), those who use both stimulants and opioids could have more complex and difficult lives including increased likelihood of being dependent on substances (Al-Tayyib et al., 2017; Palmer et al., 2020). Drug use activities and networks may have a stronger presence in their life and form a more salient part of their self-image or identity, which are characteristics that have been associated with increased frequency of drug use, equipment sharing and greater difficulties in managing drug use (Al-Tayyib et al., 2017; De, Cox, Boivin, Platt, & Jolly, 2007; Lakon, Ennett, & Norton, 2006; O'Donnell, 2015; Plumridge & Chetwynd, 1999). These factors may contribute to poorer health outcomes and increased risk of BBV transmission among this group (De et al., 2007; Puzhko et al., 2017; West, 2019). Additionally, while opioid agonist treatment (OAT) is an effective treatment to reduce harms of opioid use, there is no pharmacotherapy for stimulant use disorder (Siefried, Acheson, Lintzeris, & Ezard, 2020).

A significant barrier to harm reduction efforts is the criminalization of drug use and the consequent persistence of stigma and discrimination (DeBeck et al., 2017; Goodyear et al., 2021). It is well known that stigma impacts health care access, uptake, and outcomes among PWID (Brener, von Hippel, von Hippel, Resnick, & Treloar, 2010; Logie & Gadalla, 2009; van Boekel, Brouwers, van Weeghel, & Garretsen, 2013). Stigma towards PWID is prevalent among both the general public and among health workers in particular (Broady et al., 2020; van Boekel et al., 2013), and those who inject more frequently and present with comorbidities and more complex lifestyles may experience greater stigma (Biancarelli et al., 2019; Paquette, Syvertsen, & Pollini, 2018). Over time this stigma may be internalized, whereby the person comes to believe the stigmatizing attitudes that others hold about them (Corrigan, Watson, & Barr, 2006). Internalized stigma among PWID has been associated with increased depression and lower self-esteem, greater severity of drug use and less access to pharmacies and needle and syringe programs (Bayat et al., 2020; Cama, Brener, Wilson, & Hippel, 2016; Rivera, DeCuir, Crawford, Amesty, & Lewis, 2014; von Hippel, Brener, & Horwitz, 2018). While it is difficult to determine the direction of many of these relationships (more drug use can lead to more health problems, greater interaction with health care and more opportunity to encounter and internalize stigma), it is nonetheless relevant to recognize the compounding effects of stigma on health-related behaviors and access to quality care particularly for this highly vulnerable polydrug using group. On the other hand, while drug use remains criminalized it is important to focus on factors that can ameliorate the impact of stigma for PWID. In particular, research suggests that attachment to a community or social network of PWID can limit the negative consequences of stigma, increase social capital and provide a positive frame of reference (Brener et al., 2021).

To better understand risk practices between different groups of PWID and to ensure harm reduction efforts address their specific needs, this research aimed to assess differences between three groups of PWID:

those who inject opioids and no stimulants, those who inject stimulants and no opioids and those who inject both stimulants and opioids. It is hypothesized that those PWID who inject both opioids and stimulants started injecting at a younger age, use drugs more frequently, are more likely to share needles or other injecting equipment, and to have been diagnosed with HCV than those who inject only opioids or only stimulants. Further, this combined opioid and stimulant group will experience more expressed stigma from health workers, friends, family, and sexual partners and show greater internalized stigma than those whose primary drug is either an opioid or a stimulant. Therefore, it is anticipated that the opioid and stimulant using group will have more negative health and wellbeing outcomes related to their drug use when compared to the other two groups. It is also likely that those who inject both stimulants and opioids experience more social marginalization, which may result in greater attachment to a community and social network of PWID and perceive their drug use as forming an important part of their self-image.

## 2. Methods

### 2.1. Data collection

Participants were recruited through member organizations of the Australian Injecting and Illicit Drug Users League (AIVL), representing PWID in each Australian state and territory. Nominated representatives of these nine organizations provided NSP clients with a copy of the paper-based survey and asked them to self-complete the survey in their own time. Surveys were returned to a drop box or in a sealed envelope to staff and these were sent back to the researchers. As survey completion was anonymous and confidential, response rates are not known. Data collection occurred from June–November 2018. Participants were not specifically reimbursed, but each organization was given funding to assist with data collection and used this money to provide participants with refreshments and reimburse travel costs. Ethics approval was obtained from the Human Research Ethics Committee at UNSW (HC16129).

### 2.2. Measures

#### 2.2.1. Drugs injected

Respondents were asked to indicate drugs they had injected in the last month (none, cocaine, heroin, methadone/buprenorphine (Subutex/Suboxone), methamphetamine, performance/image-enhancing drugs, pharmaceutical opioids, other). Respondents not selecting an opioid or stimulant drug were omitted. The remaining respondents were divided into three groups:

1. Opioids only, if they indicated injecting one or more opioid drug (heroin, methadone/buprenorphine (Subutex/Suboxone), pharmaceutical opioids, or entered an opioid drug such as morphine in 'other') and no stimulant drugs (methamphetamine, cocaine, or a stimulant such as speed, ice, or dexamphetamine in 'other');
2. Stimulants only, if they indicated injecting one or more stimulant drugs and no opioid drugs;
3. Both opioids and stimulants, if they indicated injecting one or more opioid drug and one or more stimulant drug.

#### 2.2.2. Injecting frequency

Respondents were asked how often they had injected drugs in the last month and responded using four categories: daily or more, more than weekly but not daily, less than weekly, and not in the last month (excluded from analysis).

#### 2.2.3. Receptive equipment sharing

Participants were asked (1) about receptive needle sharing practices, (i.e., if in the last month they had had used a needle after someone else had used it), coded as 'needle-sharing'; and (2) what other injecting

equipment (e.g., spoons, filters, tourniquets) they had used after someone else in the last month, coded as 'equipment-sharing'.

#### 2.2.4. Psychological distress scale

Psychological distress was measured using the Kessler Psychological Distress Scale (K10; Kessler et al., 2003). Participants were asked questions about the frequency of ten feelings in the past four weeks and responded using five options ('all of the time' to 'none of the time') for a total score of between 50 (severe distress) and 10 (no distress) ( $\alpha = 0.92$ ).

#### 2.2.5. Personal wellbeing index

The Personal Wellbeing Index (PWI; International Wellbeing Group, 2013) measures satisfaction with seven different quality of life domains (e.g., standard of living, health, relationships) using an 11-point scale from 'no satisfaction at all' to 'completely satisfied'. Possible scores range from 0 to 100 and higher scores indicating higher levels of wellbeing ( $\alpha = 0.91$ ).

#### 2.2.6. Injecting drug use stigma or discrimination

Participants were asked about the frequency of experiencing stigma or discrimination in relation to their injecting drug use over the last 12 months, using five response categories ('never' to 'always'). Additional questions assessed the frequency of negative treatment by a health worker, sex or intimate relationship refusal ("People didn't want to have sex or an intimate relationship with me"), and any stigma or discrimination in reference to their injecting drug use from family, friends, or sexual partners over the past twelve months. These were also scored the 5-point scale but included a sixth option of 'not applicable' for health workers and sex or intimate relationship refusal and 'I don't have any' for family, sexual partners, and friends. Responses of 'not applicable' and 'I don't have any' were omitted prior to analysis.

#### 2.2.7. PWID community attachment

A measure of attachment to a community of PWID adapted from Brener, Callander, Slavin, and de Wit (2013) and Brener et al. (2015) consisted of four items assessing how much the respondent felt they were part of a PWID community, how many of their friends inject drugs, how much of their free time is spent with PWID, and how much of their time is spent helping other PWID. Responses were scored on a 5-point measure and summed to create a scale (range 4–20,  $\alpha = 0.77$ ); higher scores indicative of a greater sense of PWID community attachment.

#### 2.2.8. Salience of injecting drug use in self-image

Participants were asked a single item to indicate the extent to which injecting drug use forms a strong part of how they see themselves on a scale of 0 (not a strong part) to 10 (very strong part).

#### 2.2.9. Internalized stigma

Four items were adapted from the Internalized AIDS-Related Stigma Scale (Kalichman et al., 2009) relevant to PWID (e.g., "Injecting drug use makes me feel dirty" or "I am ashamed that I inject drugs") and scored on a 5-point scale from 'strongly disagree' to 'strongly agree'. The items were summed to form a scale (range 4–20,  $\alpha = 0.92$ ), with higher scores indicative of greater levels of internalized stigma.

### 2.3. Sample characteristics

Demographic characteristics of the sample included age, gender identity, sexual identity, highest level of education, and current employment status. Participants were also asked the age at which they first injected drugs, and whether they had ever been diagnosed with HCV.

### 2.4. Data analysis

A factorial between groups analysis of variance (one-way ANOVA) with post hoc (Games-Howell) test was conducted to investigate differences between the three drug-type groups by the following continuous variables: age first injected, salience of injecting drug use in self-image, community attachment, internalized stigma, psychological distress, and personal wellbeing. Ordinal variables were analyzed using a Mann-Whitney U comparison that measured differences in injecting frequency and injecting drug use stigma between those who used either opioids and methamphetamines and those who used both. Pearson chi-square tests with Bonferroni correction were conducted to investigate differences in binary variables indicating needle-sharing, other equipment-sharing, ever-diagnosed with HCV, male or female gender (14 people who provided different gender identities were omitted from this analysis only), high school completion, and current employment. Analysis was conducted using IBM SPSS Statistics Version 27.

## 3. Results

Of the 603 PWID from across Australia who returned a survey, 68 were excluded for indicating no opioid, stimulant or other drug use in the past month. Of the remaining 535 participants, 154 (28.8%) injected both opioids and stimulants in the last month, 173 (32.3%) injected opioids only, and 208 (34.9%) injected stimulants only. The mean ages of respondents by group were similar: 42.0 years (SD = 9.01), 44.2 years (SD = 10.74), and 42.5 years (SD = 9.66) respectively. A greater proportion of people who injected both stimulants and opioids were male compared to the opioids-only group, while a higher number of people who only injected opioids were likely to be employed compared to the stimulants-only group. There were no significant differences between groups according to sexual identity or high school completion. Other demographic and drug use information is presented in Table 1.

Participants who injected opioids only began injecting at a similar age to those who injected opioids and stimulants, which was 3.1 years younger than those who injected stimulants-only (95% CI = -5.60, -0.68;  $F(2, 390) = 6.50, p = .002$ ). Those who injected both opioids and stimulants experienced more psychological distress than people who injected stimulants-only ( $M = 3.15, 95\%CI = 0.95, 5.35; F(2, 518) = 5.10, p = .006$ ). People who injected both opioids and stimulants injected more frequently in the past month than people who injected either opioids or stimulants ( $U = 23751, z = -6.17, p < .001, r = -0.25$ ).

Those who injected both opioids and stimulants were more likely to report experiencing any stigma or discrimination in relation to their injecting drug use within the last twelve months compared to people who injected either opioids or stimulants ( $U = 20759.5, z = -3.37, p = .001, r = -0.15$ ). People who injected both opioids and stimulants were also more likely to report being treated negatively or differently by sexual partners ( $U = 15066, z = -2.58, p = .010, r = -0.12$ ), in the last twelve months. There were no significant differences by drug-type in reported sex or intimate relationship refusal, in stigma or discrimination by family, friends or health workers, or in internalized stigma or personal wellbeing scores.

People who injected both opioids and stimulants reported stronger salience of injecting drug use to their self-image ( $F(2, 523) = 7.94, p < .001$ ) and greater community attachment with other PWID ( $F(2, 525) = 12.80, p < .001$ ) compared with people who had injected either opioids or stimulants. Further, those who injected both opioids and stimulants were more likely to have ever been diagnosed with HCV ( $\chi^2(1, N = 510) = 5.28, p = .022, \phi' = 0.10$ ). Of those ever diagnosed with HCV, more reported receiving treatment than not ( $n = 148, 54\%$ ), and there were no differences between the three groups in this.

**Table 1**  
Demographic and injecting risk characteristics of a 2018 Australian sample of people who inject drugs by three groups (drug-type/s injected).

Characteristic	Both opioids and stimulants		Opioids only		Stimulants only		Full sample	
	n	%	n	%	n	%	n	%
Gender								
Male	102	67.5	91*	53.5	118	58.4	311	59.5
Female	47	31.1	76*	44.7	79	39.1	202	38.6
Different identity	2	1.3	3	1.8	5	2.5	10	1.9
Sexual identity								
Heterosexual	110	74.8	135	80.8	146	73.0	391	76.1
Homosexual	9	6.1	7	4.2	19	9.5	35	6.8
Bisexual	21	14.3	14	8.4	27	13.5	62	12.0
Different identity	7	4.8	11	6.6	8	4.0	26	5.1
Completed high school	71	47.3	84	49.7	99	49.3	254	48.8
Currently employed	26	16.9	50***	28.9	28	13.5	104	19.4
Ever diagnosed with HCV	90	62.1	100	59.9	81***	40.9	271	53.1
Shared a needle-syringe	31	20.3	24	14.0	32	15.4	87	16.4
Shared injecting equip	69	44.8	60	34.7	73	35.1	202	37.8
Drugs injected <sup>#</sup>								
Heroin	111	72.1	118	68.2			229	42.8
Methadone/buprenorphine	54	35.1	34	19.7			88	16.4
Pharmaceutical opioids	54	35.1	47	27.2			101	18.9
Other opioids			2	1.2			2	0.4
Methamphetamine	145	94.2			205	98.6	350	65.4
Cocaine	21	13.6			9	4.3	30	5.6
Other stimulants	9	5.8			7	3.4	16	3.0
Injecting frequency <sup>#</sup>								
Less than weekly	13	8.4	25	14.4	46**	22.1	84	15.7
More than weekly but not every day	44	28.6	62*	35.8	84	40.4	190	35.5
Daily or more	97	63.0	86*	49.7	78**	37.5	261	48.8

Note. <sup>#</sup>Question pertains to behaviours within the last month. Significant differences in characteristic prevalence between both opioids and stimulants and either opioids only or stimulants only drug-type groups indicated by: \*p < .05; \*\*p < .01; \*\*\*p < .001

#### 4. Discussion

Similar to other research, the findings from this study indicate that those who use both opioids and stimulants have patterns of drug use that are different to those who only use opioids or stimulants, and that this could be linked to increased drug harms, poorer health outcomes and greater experiences of stigma (Al-Tayyib et al., 2017; Biancarelli et al., 2019; Glick et al., 2018, 2021; Palmer et al., 2021; Paquette et al., 2018). This group were more likely to be male, to engage in more frequent drug use, and be diagnosed with HCV than those who used only opioid or only stimulant drugs. Further, the dual opioid-stimulant group reported more frequent experiences of expressed stigma and discrimination and increased salience of drug use to their self-image.

It is notable that the group who injected both opioids and stimulants report greater connectedness to a community of PWID. Previous research suggests that being attached to a community of similar people who share common vulnerabilities and experiences of marginalization can buffer against or reduce the negative consequences of stigma (Brener et al., 2021; Earnshaw, Smith, Cunningham, & Copenhagen, 2013). Community connectedness could be viewed as particularly important for those who engage in a behavior which attracts social condemnation, as PWID may be rejected or stigmatized by family and friends and it is likely their social networks are thus comprised largely of other PWID (Mallet, Rosenthal, & Keys, 2005). While having some identified protective benefits, being part of a social network of PWID can increase the frequency and variety of drugs consumed and increase possible harms associated with injecting drug use (Brener et al., 2021; Creemers et al., 2010; Simons-Morton & Chen, 2006). A greater degree of social of connectedness among networks of PWID has been found to be associated with increased risk behaviors including sharing of injecting equipment (De et al., 2007; Friedman, Curtis, Neaigus, Jose, & Des Jarlais, 1999; Lakon et al., 2006). Compared to the stimulant-only and opioid-only groups in our sample, those who injected both reported greater frequency of injecting and were more likely to report being diagnosed with HCV but there were no differences in frequency of

sharing injecting equipment.

BBV transmission among PWID remains a major public health concern, hence public health initiatives to reduce the spread of HCV and HIV need to develop innovative programs to effectively reach those at risk (Heard, Iversen, Geddes, & Maher, 2020; Wodak & Cooney, 2006). This study suggests that those who inject both stimulants and opioids are more likely to develop drug use patterns that involve more frequent use and more health-related concerns, and this may lead to people feeling uncomfortable engaging with health systems (Bayat et al., 2020; Cama et al., 2016; von Hippel et al., 2018). As OAT is protective against HCV infection among people who inject opioids (White, Dore, Lloyd, Rawlinson, & Maher, 2014), these study findings could inform advocacy to improve the accessibility of high-quality OAT and to encourage more nuanced health promotion of the benefits of OAT to people who engage in polydrug injecting. This is particularly important given that research suggests that rates of polydrug use are high among people receiving OAT and this can compromise the positive outcomes known to be associated with OAT (Heikman, Muhonen, & Ojanperä, 2017; Kwon et al., 2017; Wang, Li, et al., 2017; Wang, Min, et al., 2017). For example, use of stimulants such as cocaine alongside heroin has been found to result in lower retention in treatment and increased risk of relapse to heroin use (Bovasso & Cacciola, 2003; Williamson, Darke, Ross, & Teesson, 2006). Service providers need to understand the unique needs of people who use both opioid and stimulants (Hassan & Le Foll, 2019). For this group of PWID, OAT could be viewed as point of intervention enabling health providers to provide education about the risks associated with dual opioid and stimulant use, while also ensuring access to counseling, health care and other support services to assist with stimulant use alongside treatment for opioid use (Mittal et al., 2019; Vashishtha, Mittal, & Werb, 2017).

A strategy that builds on the identified community connections among this group of stimulant and opioid users is to resource and support social networks that promote peer-based harm reduction activities and act to mitigate the negative impacts of stigma by increasing a sense of belonging. Peer distribution is known to be effective in increasing the

distribution reach of sterile equipment to those who may not attend harm reduction services (Brener, Bryant, Cama, Pepolin, & Harrod, 2018; Bryant, Brener, Pepolin, & Harrod, 2019; Newland, Newman, & Treloar, 2016; Small et al., 2012). Further, this study points to possibilities for social networks not just as technology distribution mechanism but also as a site of intervention and care. Harnessing social and community networks via peers has significant potential to utilize existing resources within communities of PWID to promote harm reduction messages and deliver important information about HCV testing and care (Newland et al., 2016; Small et al., 2012). Developing further peer-led harm reduction initiatives such as naloxone and drug testing kit distribution, rapid HCV testing, safe injecting rooms, and advocacy and support services, should be prioritized, especially in the context of continuing drug prohibition and its ensuing stigma effects for PWID (Henderson, Madden, & Kelsall, 2017).

#### 4.1. Limitations

This study did not assess whether people who used both opioids and stimulants used them in combination or at different times, which should be included in future research to establish whether there are different harms and risk practices associated with different patterns of co-use. The survey did not include questions on overdose or on injecting practices which can increase health harms (e.g. groin injection), so this cannot be compared to other research which found these to be higher among the dual injecting group (Glick, Klein, Tinsley, & Golden, 2021; Palmer et al., 2021). Nor did the research include questions on access to health care, aside from HCV treatment uptake. Such questions are necessary to establish whether those who use both stimulants and opioids are more likely to experience other harms like vein damage, infections or overdose, and if they are less likely to access health services or engage in HCV treatment. Peer survey distribution and self-reported measures increase the likelihood of biases, including sampling and social desirability effects. Multiple comparisons were not corrected across the three univariate tests conducted and potential confounders were not controlled; this points to cautious interpretation of statistical significance. Finally, as the data is cross-sectional causality cannot be inferred; hence there may be other factors which are not measured in the research that could contribute to the noted harms. For example, experiencing greater stigma may result in people using a combination of drugs more frequently to combat the negative impact of stigma rather than the reverse.

#### 4.2. Conclusions

This analysis has identified differences in injecting related risk behaviors associated with injecting both stimulants and opioids compared to those who primarily inject either one of these drugs. These findings can provide the impetus for the development and adaptation of harm reduction and health interventions which are targeted to address the specific needs of people who inject both opioids and stimulants, including prioritizing peer-based approaches.

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### 6. Contributors

Brener is the lead author in developing the design of the analysis and writing up of the paper. Caruana conducted data analysis and contributed to drafting of the results and to the literature review. Broady and

Cama were involved in the design of the survey, the data collection and in reviewing full drafts of the paper. Madden represents the community of people who inject drugs, she contributed to reviewing drafts of the paper and critically assessing the content to assure it represented the community of PWID. Ezard and Treloar were involved in the conceptualisation of the research and the data analysis and contributed to reviewing drafts of the manuscript.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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