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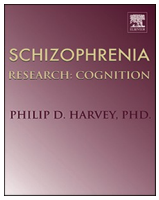

Short communication

SIPD or psychotic disorder with stimulant use

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1. Introduction

Use of stimulants, such as methamphetamines (MA) or crack/cocaine, can have serious mental health implications. It can trigger acute psychosis or lead to the onset of a primary psychotic disorder in nearly 30 % of MA-induced psychosis cases (Barr et al., 2006; Wearne and Cornish, 2018). Despite the plethora of studies on stimulant-induced psychotic disorder (SIPD), clear answers on those who will later be diagnosed with a primary psychotic disorder diagnosis remain elusive. SIPD develops in individuals who present acute psychotic symptoms post-stimulant intoxication. Complicating diagnosis, many stimulant users often co-use multiple substances and present with diverse psychiatric conditions (Lecomte et al., 2013). Our recent meta-analysis (Lecomte et al., 2018) showed that 36.5 % of MA users, experienced at least one psychotic episode in their life.

Psychotic symptoms are common in those who use stimulants; yet, certain individuals experience persistent symptoms above and beyond what would be expected with a SIPD (Rodríguez-Toscano et al., 2023). Lifetime stimulant use among individuals with psychotic disorders varies between 15 % and 33 % (Rodríguez-Toscano et al., 2023; Buhler et al., 2002), with negative consequences on symptoms, interpersonal relationships, motivation, role functioning, and activities (Addington and Addington, 1998). Recent findings indicate that 14 % of individuals with an initial psychotic episode use stimulants (Abdel-Baki et al., 2017), and face diminished quality of life, employment challenges, a higher likelihood of homelessness, persistent stimulant use disorder, and poor adherence to psychiatric treatments (Ouellet-Plamondon et al., 2017; Bouchard et al., 2022).

Rapid identification of those likely to develop a primary psychotic disorder following the presentation of a psychotic episode in the context of stimulant use is crucial to determining timely and efficacious clinical interventions, as prolonged untreated psychosis correlates with poorer recovery outcomes (Hui et al., 2018; Emsley et al., 2013). Since they are at high risk of developing a primary psychotic disorder, SIPD are referred and treated in early intervention services. Moreover, SIPD demands different treatments than primary psychotic disorders in terms of psychosocial (Smout et al., 2010; Vocci and Montoya, 2009), and pharmaceutical interventions (Siefried et al., 2020). Also, many SIPD might resolve over time and therefore may not need long term pharmacological interventions upon cessation or reduction of stimulant use. Discriminating who is more likely develop a primary psychotic disorder would allow more appropriate and cost-effective interventions to be offered.

Distinguishing between primary and substance-induced psychotic

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disorders in stimulant users is intricate. Accurate diagnosis demands a thorough evaluation of the relationship between symptoms and stimulant usage, psycho-diagnostic assessments, and other pertinent clinical evaluations following stimulant cessation. Such thorough assessments during emergency or short hospital stay are rarely available.

Studies that have sought to discriminate between SIPD and individuals who develop a primary psychotic disorder have focused mainly on clinical symptoms. Although some studies have shown that dual diagnosis patients (i.e. those with a diagnosed primary psychotic disorder and comorbid substance use disorder) have more verbal hallucinations, negative symptoms and conceptual disorganization, the results remain inconclusive overall (Wearne and Cornish, 2018). The few studies devoted to neurocognition suggest, to date, that primary psychotic disorders are associated with more cognitive impairments than SIPD (Potvin et al., 2018). Even fewer studies have looked at social cognition and cognitive biases as discriminating variables (Diotte et al., 2022).

From our own and others' studies on psychosis in the context of stimulant use, we have generated a list of potential candidate variables. As such, this pilot study aimed to narrow the list of candidate variables that could quickly discriminate, even during short hospital stays for acute states, between SIPD and primary psychotic disorder (triggered or exacerbated) by stimulant use.

2. Methods

A total of 26 participants with at least one psychotic episode occurring in the context of stimulant use within the last five years consented to the study. Inclusion criteria were: treated for a stimulant-related psychotic episode, being under 45 years old, capable of providing informed consent, and proficiency in French or English. We excluded individuals with neurological disorders or an IQ below 70. We recruited participants from early psychosis clinics, psychiatric emergency rooms (ERs), addiction psychiatry clinics, and homeless shelters. Approvals from the relevant research ethics boards from Montreal and Vancouver, Canada were obtained.

Eligible participants were asked to complete a battery of questionnaires, online, via a secured survey platform (Qualtrics). Psychiatric symptoms, childhood adversity and substance use (problems) were measured with the *Brief Psychiatric Rating Scale* (BPRS-E), the *Brief Trauma Questionnaire*, the *Time-Line Follow-Back* and the *ASSIST*. The cognitive battery comprised measures of attention, executive functions, speed of processing, verbal and visual learning, visuo-spatial abilities, working memory, emotion recognition, theory of mind and cognitive biases (for a complete list of the tests, please see Table 1). Given the COVID-19 pandemic, the clinical interviews and cognitive tests were performed online, either via the Milliseconds website, or during an interview (Zoom) with a trained and supervised psychology graduate trainee. Interviews took an average of 3 h.

3. Results

Sixteen were recruited from hospital and clinical settings, and 9 from homeless shelters. Clinical records reported that 11 were diagnosed with

Table 1
Means, standard deviations, and effect sizes between daily and non-daily stimulant users.

Mean (SD) or N (%)	Norms[a]	FEP (not using daily) (N = 14)	SIPD (using daily) (N = 11)	Cohen's d (FEP vs SIPD)	Cohen's d[c] (norms vs SIPD)
Age		26.00 (5.82)	36.18 (9.17)	−1.60**	
Male		9 (64.3 %)	10 (90.9 %)	−0.71	
Female or non-binary		5 (35.7 %)	1 (9.1 %)		
Single	36.5 %	13 (92.9 %)	9 (81.8 %)	0.38	N/A
11th grade degree or higher	73 %	8 (57.1 %)	6 (54.5 %)	0.05	
Smokes nicotine daily	15 %	9 (64.3 %)	9 (81.8 %)	−0.41	
Currently on antipsychotics		12 (86 %)	2 (18 %)	1.92***	
Psychiatric symptoms (BPRS)	N/A				
Total symptoms		43.50 (8.34)	45.73 (11.87)	−0.25	
Positive symptoms		8.50 (2.10)	11.09 (5.96)	−0.80	
Negative symptoms		8.86 (4.33)	7.82 (2.82)	0.31	
Depression – CDSS total	3.02 (2.58)	4.71 (5.44)	7.00 (4.34)	−0.49	−1.3
Theory of mind - Stories		17.00 (4.95) (z = −1.07)	12.18 (5.69) (z = −3.57)	1.00*	N/A
Emotion recognition - PENN correct	0.86 (0.08)	0.82 (0.09)	0.70 (0.12)	1.26*	1.9
Verbal memory - CVLT (trial 1–5)	50 (50th percentile)	43.36 (12.31)	33.45 (9.31)	0.96*	N/A
Visual-spatial memory - BVMT delay	11 (50th percentile)	10.36 (2.56)	6.45 (4.25)	1.36*	N/A
Executive functions, Rey figure total	24 (50th percentile)	29.18 (6.59)	24.64 (9.83)	0.64	N/A
DACOBS - Jumping to conclusions	22.36 (4.98)	26.07 (7.61)	29.55 (3.47)	−0.70	−1.5
DACOBS - Inflexibility	19.26 (4.66)	21.29 (7.52)	19.09 (3.67)	0.43	0.03
DACOBS - Attention for threat	23.95 (6.13)	29.29 (8.84)	28.36 (6.71)	0.12	−0.7
DACOBS - External attribution	16.15 (4.61)	19.79 (8.71)	23.73 (7.79)	−0.50	−1.6
Trail making A (errors)		0.64 (0.84)	2.55 (2.25)	−1.52*	
Trail making A (time in s)	27.2 (9.03)	59.37 (30.17)	111.25 (54.99)	−1.47*	−3.2
Trail making B (errors)		2.14 (3.78)	3.55 (4.20)	−0.38	
Trail making B (time in s)	63.16 (24.19)	85.20 (47.76)	110.88 (60.11)	−0.53	−1.4
FESFS[b] - Living skills	4	3.34 (0.40)	3.27 (0.62)	0.15	N/A
FESFS - Interacting with others	4	2.86 (0.72)	2.64 (0.48)	0.39	
FESFS - Friends and activities	4	2.77 (0.70)	2.41 (0.50)	0.64	
FESFS - Intimacy	4	1.96 (0.87)	2.13 (0.90)	−0.21	
FESFS - Family	4	3.05 (0.74)	1.76 (0.86)	1.78***	

[a] Norms are scores for same age group for people without known psychopathology found in the literature or described in the test's coding manual.
[b] The First Episode Social Functioning Scale (FESFS) was designed to have a ceiling effect with normal controls - no normative data has yet been reported.
[c] p could not be calculated given the different samples sizes (norms vs our study).
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

a primary psychotic disorder and 16 had one or more SIPD episodes without a subsequent primary psychotic disorder diagnosis. One group ($N = 14$) consisted of younger individuals who had developed a primary psychotic disorder, recruited from early psychosis clinics, who were occasional stimulant users or had quit after having developed a psychotic disorder and another group ($N = 11$) consisted of daily stimulant users, older, mostly male, who had unstable (or homeless) living conditions and who were unlikely to take antipsychotics (Table 1). Uncorrected group comparisons revealed that daily stimulant users (during the past month) had more psychotic symptoms (large effect size), more depression (medium effect size), worse cognitive functioning for all of the measures, including verbal memory, visual memory, rote memory (large effect size), and worse executive functioning (medium effect size), when compared to those with a first episode of a primary psychotic disorder (FEP) who did not use daily. They also had worse theory of mind, emotion recognition (large effect size), and more jumping to conclusion and external attribution biases (medium effect sizes). Only belief inflexibility bias was worse in those with a first psychotic episode (small-medium effect size). In terms of functioning, the daily stimulant users had fewer interactions with friends and family (medium and large effect size) but were slightly more likely to be in a relationship, and to have had recent intimacy/sexual interactions (small effect). The two samples were indistinguishable on all the other measures. We added, in Table 1, norms or results from other studies, as well as the effect sizes of the SIPD group compared to a normative sample, when available. As expected, the participants from both groups performed worse than 'normal controls', with large effects sizes for the SIPD group regarding depression, specific cognitive biases, and speed of processing (see Table 1).

4. Discussion

In line with other studies, our findings based on a small sample suggest that daily use of stimulants may impact all domains of clinical, cognitive and social functioning. Although there has been some debate in the literature about cognitive deficits in stimulant users, the result of the present small study are in line with our previous meta-analysis, suggesting that stimulant users present with important cognitive deficits that appear to worsen with longer-term use (Potvin et al., 2018). SIPD are therefore extremely hard to distinguish from primary psychotic disorders, especially in the context of long-term daily use.

We need to verify if similar results would be found with larger samples, ideally as early as the first contact with services for SIPD. It is possible that the absence of difference between the groups, and the worse presentation of the daily users, might be linked to the differences in poor sleep and/or nutrition (for those recruited in homeless shelters), duration of exposition to stimulants, or other comorbid conditions, not measured. It is also clear that not taking antipsychotics can also impact performance on the tasks used in this study. Years of chronic stimulant use can lead to severe and chronic psychotic symptoms that resemble primary psychotic disorders (Lecomte et al., 2013). The older age and the more severe psychotic symptoms in the daily users seem to follow this pattern.

Our study has several limitations. Our sample is small, without statistical correction for the multiple analyses, and at high risk of bias, notably because recruitment was conducted in very specific treatment settings. Furthermore, in the COVID-19 context, we were restricted physical access to the ER, and could therefore not detail the symptoms at initial presentation. Most of our testing was therefore retrospective, with some reporting SIPD hospitalizations that took place up to two years ago. Moreover, participants were hard to recruit as most did not stay for long in hospital, were unlikely to be interested in getting involved in research, or were hard to reach once outside. Moreover, daily stimulant use with acute psychotic symptoms in part of the sample made it impossible to confirm the diagnoses. Yet, our results might represent a clinical reality with SIPD being more frequent in older chronic stimulant users, who are also more likely to be alienated from family and friends, and primary psychotic disorders triggered by stimulants could be more common in younger adults, even after recreational use. At this point, we do not have clear candidate variables to discriminate both conditions as cognitive and social deficits were found in both populations, although not at the same level. Further and larger studies are needed to establish candidate variables at early presentation that could help us in our evaluation of the treatment needs of individuals at high risk of primary psychotic disorders in the context of stimulant use.

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CRediT authorship contribution statement

Tania Lecomte: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Donna Lang:** Writing – review & editing, Methodology, Investigation. **Stéphane Potvin:** Writing – review & editing, Investigation, Data curation, Conceptualization. **Félix Diotte:** Resources, Project administration, Methodology, Investigation. **Audrey Livet:** Writing – review & editing, Project administration, Methodology. **Melissa Cimaglia:** Resources, Project administration, Methodology. **Amal Abdel-Baki:** Project administration, Methodology, Investigation. **Marie Villeneuve:** Project administration, Methodology, Investigation. **Didier Jutras-Aswad:** Resources, Project administration, Methodology. **Alicia Spidel:** Project administration, Methodology.

Declaration of competing interest

All authors mention no previous or current financial or personal relationship with people or organizations that could bias the work in any way.

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