



Mind reading abilities in opiate-dependent patients: An exploratory study

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ABSTRACT

Objectives: Impairments in social cognition have been described as playing a major role in the maintenance of addictive behavior in substance abusers. This study aimed to investigate the Theory of Mind (ToM) ability of opiate-dependent (OD) patients and to explore whether TOM ability was correlated with length of substance abuse, age at onset of substance abuse and length of abstinence.

Methods: OD patients ($N = 29$) and non-dependent individuals (NDI) ($N = 29$) were submitted to the Theory of Mind Assessment Scale (Th.o.m.a.s.), a semi-structured interview, and to the *Versailles-Lecture Intentionnelle en Situation* (V-LIS), a movie paradigm in which participants have to infer the characters' intentions.

Results: The results confirmed a deficit in ToM ability in OD patients, with OD patients demonstrating poorer performance than NDI on both the V-LIS and the Th.o.m.a.s. The combination of perspective taking and reflecting on others' mental states was particularly difficult for OD patients. Furthermore, impairments in ToM abilities were not correlated with the age at onset of substance abuse or to the duration of substance abuse or abstinence.

Conclusions: The results suggest OD patients may have impaired social cognition, demonstrating deficits in even basic social interaction skills, which may constitute a risk factor for addiction. These findings underline the importance of developing interventions to improve social cognition ability during the rehabilitation of OD patients.

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1. Introduction

Deficits in emotional information processing in patients with substance use disorders (SUD) and especially in opiate-dependent (OD) patients have been first studied in terms of difficulties in identifying and expressing one's own emotions through the concept of alexithymia [1,2]. Since, these deficits have been observed at different levels of the emotional processes (identification, categorization, expression) demonstrating both a prominent difficulty in identifying their own emotions but also those of other people [3–6]. Thus, these emotional deficits would affect the way individuals with SUD assess the intentions or the mental states of others [7,8] and could constitute a major risk factor for maintaining substance use behaviors as it may trigger stressful interpersonal situations that patients with SUD may try to cope by consuming psychoactive substances [9–11]. However, regarding the methodology employed to investigate emotional processes in these

patients, previous studies have revealed mixed findings that in fact, could be related to different processes of social cognition.

The first studies conducted on the socio-affective abilities of OD patients assessed their ability to recognize emotional facial expressions (EFE) alone or in combination with other emotional indicators such as prosody and body postures [4,7,10]. These studies provided convergent evidence, suggesting that OD patients displayed impairment in their ability to decode other people's emotions and seemed to be unaware of their own emotional difficulties [12]. In line with these studies, further researches have investigated social cognition mainly through "Theory of Mind" (ToM) (also called 'mentalizing' or 'mind reading'). ToM is defined as the ability to explain and predict one's own and other individuals' behaviors by inferring mental states [13]. It is acquired during childhood and could be considered as an elementary and basic process in social activities. There is today growing evidence that impaired ToM may also lie at the core of inadequate behaviors observed in different psychiatric disorders [14]. ToM ability is characterized by two dimensions: a cognitive one, which requires a cognitive understanding of other's mental states, and an affective one which refers to the ability to infer the emotions of others. These two components are underpinned by two different neuronal networks [15] and are differently impaired in

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various mental disorders. Thus, this distinction between cognitive and affective ToM may constitute a starting point for understanding mentalization in patients suffering from addiction. Nevertheless, beyond these dimensions, ToM also refers to different types of mental states: volitional states that refer to desires and intentions; epistemic states that refer to knowledge and beliefs; and positive and negative emotional states [16]. The distinction between the ability to infer others' beliefs about the state of the world (defined as first-order ToM) and the ability to understand nested mental states, that is, to infer others' beliefs about the mental state of someone else (defined as second-order ToM) can also be noted [17]. ToM also refers to the ability to understand one's own mental states (first-person ToM) and the ability to understand others' mental states (third-person ToM) [18]. Finally, one can distinguish between an egocentric perspective, in which others are represented in relation to the self, and an allocentric perspective, in which the mental states of others are represented independently of the self [19]. Importantly, these different ToM dimensions are underpinned by different brain networks [20,21], suggesting that ToM is complex constructs that should be more in-depth examined.

Rare studies have focused on ToM abilities in alcohol-dependent patients [22–26] and abusers of other substances such as cocaine, methamphetamine and cannabis [27–32]. Furthermore, some of the studies focusing on mentalistic capacities in patients with SUD have been conducted in patients with comorbid personality disorder [33–35] which must be distinguished from patients with SUD [36].

Among patients with SUD, the literature highlights that alcohol-dependent patients showed deficits in humor processing related to their abilities to interpret scenes [37] and detect “Faux Pas” [23,38]. However, distinguishing the cognitive and affective dimensions of the ToM, stronger evidence supports the presence of an impairment in the ability to infer emotional states (affective ToM) in alcohol-dependent patients based on the results of self-report questionnaires [23,26,39] and performance tasks such as the “Reading the Mind in the Eyes Test” (RMET) [25,40] or the “Movie for Assessment of Social Cognition” (MASC), multiple-choice tasks requiring the identification of mental states [24].

In patients with OD, the study by McDonald et al. has especially investigated their social inference ability. In that study, opioid maintenance patients demonstrated difficulties in inferring meaning from conversations, with their ability to decode sarcastic situations identified as especially deficient, whereas abstinent OD patients did not present significant deficits [7]. In addition, based on the results of a self-report questionnaire (Empathy Questionnaire), Ferrari et al. found that recently abstinent poly-substance-dependent patients (including OD patients) scored lower than controls on the total score of empathy, and especially on the emotional dimension [41].

These different findings in OD patients at different stages of their withdrawal question the effect of duration of abstinence on social cognition. Overall, studies of SUD patients show considerable heterogeneity in the duration of abstinence, ranging from few weeks [39,40] to several months of abstinence [22], with rare studies conducted among active consumers [31] when some do not even specify this information [32]. Nevertheless, the effect of abstinence on ToM has never been studied, as has the impact of the history of addiction.

As strong conclusions cannot be drawn from the limited number of studies available, it is now essential to better identify whether specific ToM deficits exist in OD patients and to clarify the effects of the duration of abstinence, the duration of substance abuse, and the age of onset of substance abuse on social cognition. In that line, first we aimed to overcome the limitations of previous studies, particularly regarding their lack of ecological validity and the lack of precision of the different dimensions of the ToM investigated, by examining whether the ability to interpret and identify intention in simple situations of social life are impaired in OD individuals without personality disorder. Thus, as proposed by Bazin et al. [42], we investigated ToM skills using more ecological tasks, which offer a good trade-off between enriched social contexts (video scenes with sound) and precisely defined cognitive

measures targeting aspects of social cognition. We proposed to use the *Versailles-Situational Intention Reading* (V-SIR) to assess the subject's ability to infer mental states through the presentation of short video clips showing complex interactions between one or more individuals [42].

Considering its complex nature, it is also important to better identify different inherent ToM abilities in the study of ToM processes (ability to infer emotions, volitional and epistemic states, first versus second-order ToM, first versus third-person ToM, egocentric versus allocentric perspective taking). To this end, Bosco et al. developed a semi-structured interview assessing different aspects of ToM: the Theory of Mind Assessment Scale (Th.o.m.a.s.) [16], which was subsequently used to evaluate alcohol-dependent individuals [22]. They observed impairments in all ToM dimensions, identifying more difficulties related to third-person ToM than first-person ToM and the allocentric perspective than the egocentric perspective.

Thus, using the V-SIR task, we seek to verify first if simple ecological tasks are impaired in OD patients. Then, using the Th.o.m.a.s., we expected that the ToM abilities should be impaired according to the level of complexity of the intention reading tasks. We hypothesized that the items for third-person ToM would be more highly affected than those for first-person ToM and that the items for allocentric performance would be more highly affected than those for than egocentric performance, as similar results have previously been observed in other substance-dependent patients [22]. We also expected that first-order ToM would be less impaired than second-order ToM, as commonly observed, because of the higher degree of mindreading ability required for second-order tasks [43].

Finally, we proposed to explore whether these ToM performances differed in OD patients with a longer period of substance abuse, an earlier onset of substance abuse and a recent period of abstinence.

2. Material and methods

2.1. Participants

Demographic data are presented in Table 1. Twenty-nine patients who met the DSM-IV TR criteria for opiate dependence (OD) participated in the study. These patients were recruited from addiction treatment centers in Switzerland (the reinsertion and residential centers of “Association Argos”) and France (the reinsertion center of “CHRS Renovation”, and the addiction departments of the Hénin-Beaumont and Felleries-Liessies hospitals). The diagnosis of opioid dependence was made by a physician specializing in addictology. Included patients did not have recent antecedent indications of addictive behaviors other than substance dependence. Patients who had been abstinent for <48 h and more than one year were excluded.

Twenty-nine age- and gender-matched participants were selected to constitute the group of non-dependent individuals (NDI). They were recruited from the general population or at the University of Lille. They were excluded if they presented a history of any form of addictive behavior (except nicotine).

All participants were native French speakers. For both groups, the exclusion criteria included a history of psychotic disorders and personality disorder, bipolar disorder, neurological disorders or head injury, intellectual deficiency or neuroleptic or mood stabilizer treatment. All participants were volunteers and provided informed consent prior to participation.

2.2. Procedure

Data for substance dependence and consumption were obtained from the medical records of the patients; substance consumption was regularly evaluated by urinalysis in the addiction treatment centers.

Clinical assessments were individually conducted by two psychologists specifically trained for this study.

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