

## Artigo Original

# Autobiographical and semantic memory of adolescent drug users

Memória autobiográfica e semântica em adolescentes usuários de drogas

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### Abstract

**Background:** Psychiatric disorders in infancy and adolescence may impair the access to the memory of facts and events occurred during these periods. **Objective:** The main purpose of this study was to investigate the autobiographical and semantic memory of a group of adolescent drug users and a control group of adolescent non-users. **Methods:** Twenty-five males participated in each group between 13 and 17 years old. Two questionnaires were applied: Kihlstrom e Schacter (1995) for semantic memory and Borrini *et al.* (1989) for autobiographical memory. **Results:** The group of drug users had more difficulties in accessing autobiographical memory ( $p = 0.0205$ ) and semantic memory ( $p = 0.0057$ ). **Conclusions:** Some hypotheses might be raised: users presented cognitive complications that make difficult the access to long-term memories, as well as others related to the dynamics of drug use.

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**Key-words:** Autobiographical memory, semantic memory, dependence, adolescence, substance use.

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### Resumo

**Contexto:** Transtornos psiquiátricos na infância e adolescência podem prejudicar o acesso às memórias de fatos e eventos ocorridos durante esse período. **Objetivo:** O objetivo deste estudo foi investigar as memórias autobiográfica e semântica de adolescentes usuários e não usuários de drogas. **Métodos:** Participaram de cada grupo 25 adolescentes do gênero masculino, com idades entre 13 e 17 anos. Dois questionários foram aplicados: Kihlstrom e Schacter (1995), que avalia a memória semântica e Borrini *et al.* (1989), que avalia a memória autobiográfica. **Resultados:** O grupo de usuários de drogas apresentou maior dificuldade para acessar as memórias autobiográfica ( $p = 0,0205$ ) e semântica ( $p = 0,0057$ ). **Conclusões:** Algumas hipóteses podem ser levantadas: usuários apresentam complicações cognitivas que dificultam o acesso às memórias de longo prazo, e também outras causas relacionadas à dinâmica do uso de drogas.

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**Palavras-chave:** Memória, autobiográfica, memória semântica, dependência, adolescência, uso de substância.

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## Introduction

The use of drugs in adolescence has increased worldwide. During this period of life, general cognitive changes are observed and the action of chemical substances on the central nervous system affects the individual.

Unlike the action of substances in adult brains, damage has more impact on adolescents, altering their attention, comprehension and memory abilities, as well as other cognitive functions (Lezak, 1995; Croft *et al.*, 2001; White e Swartzwelder, 2005).

Autobiographical and semantic memories play a fundamental role in the global development of adolescents, allowing them to adapt to and interact with cognitive, social and affective changes.

Autobiographical memory is related to an individual's life history, permitting him/her to attribute meanings to personal experiences (McAdams, 2001). Although autobiographical memory does not remit to precise events, places and time points in the remote past, the meaning of these events remain stored due to their importance to the individual's life story. Autobiographical memory and the self are intertwined because the subject learns how to build his/her life history, connecting coherently the different events he/she experienced in the same way the analysis of these events influences such recollections (Conway, 1990; Conway, 1996; Conway e Pleydell-Pearce, 2000; Wilson e Ross, 2003).

Semantic memory consists in the ability of establishing knowledge of the world, including facts, concepts, and vocabulary, which are exempt of spatial and temporal reference, defining therefore the knowledge or "culture", or even the "competences" of the subject. The organization of this type of memory occurs in the absence of a temporal reference or specific context and refers to the information whose recollection has little or no relation to the personal history of the subject (Tulving *et al.*, 1994; Parente, 2006).

The experiences shared outside family scope, so important in this phase of life, also enable facts and new concepts to be assimilated and stored in semantic memory, contributing to the construction of a symbolic and logical-deductive reasoning.

Despite the fact that many studies about cognitive deficits in drug users have investigated autobiographical, semantic, and long-term memories in adolescents, little research has explored the relationships between these types of memory and chemical dependence in adolescence (Enebrink *et al.*, 2006).

Although the use of alcohol and/or drugs impairs long-term memory formation and retrieval (Quednow *et al.*, 2006; Glass *et al.*, 2006), studies on autobiographical and semantic memory in adolescent drug users were not found in the literature.

The aim of this study was to compare autobiographical and semantic memories of adolescent drug users

with non-user controls and to describe the differences between these two groups.

## Methods

### Participants

An observational and transversal study was carried out with approval of the Ethics Committee for the Analysis of Research Projects (CAPPesq no. 636/03) of Hospital das Clínicas of São Paulo University Medical School (HC-FMUSP). The sample comprised 25 adolescent drug/alcohol users (experimental group) and 25 adolescent non-users (control group).

### Experimental Group

The sample of adolescent drug users was selected from the Outpatient Clinic for Adolescents and Drugs of the Childhood and Adolescence Psychiatric Service (SEPIA) of the Psychiatry Institute (IPq) of HC-FMUSP.

Male subjects aged between 11 and 17 years 11 months; were diagnosed as having alcohol and/or drug abuse or addiction, according to the DSM-IV (APA, 1994), as determined by a child psychiatrist; resided in the city of São Paulo, with address and telephone for contact; and their families had to be in agreement with the evaluation proposed in this study by signing an informed consent term (HC-FMUSP).

The patients who had any clinical or psychiatric pathology (moderate or severe psychiatric or organic impairment), which required admission to general hospital or psychiatric treatment or diagnostic investigation, were excluded from this study.

### Control Group

The control group sample was selected from a public school in the city of São Paulo.

Controls were male; their age ranged from 11 to 17 years 11 months; attended regular school; resided in the city of São Paulo, with address and telephone for contact; and their families had to agree with the evaluation proposed in this study by signing an informed consent term (HC-FMUSP).

The patients who had any clinical or psychiatric pathology (moderate or severe psychiatric or organic impairment), which required admission to general hospital or psychiatric treatment or diagnostic investigation, and/or users of drugs or medicines such as benzodiazepines or neuroleptics, were excluded from this study.

## Material and Procedures

### *Protocol for collecting sociodemographic data related to drug use*

The Protocol for sociodemographic data related to drug use, modified by the Outpatient Clinic for Adolescents and Drugs of HC-SEPIA-IPq-HC-FMUSP, was applied in order to better characterize the samples and verify criteria for the inclusion and exclusion of subjects for this research.

### *Interview*

The clinical interview was conducted to obtain the objective and subjective history of the adolescent, including current complaints, prior history of personal organic disease or chronic deficits, and eventual conditions that might determine the exclusion of the adolescent from this study, such as drug use among the population of non-users.

### *Scale of the Brazilian Association of the Institutes of Market Research*

No information on average family income was obtained because many adolescents were not able to provide such data. For this reason, the scale of the Brazilian Association of the Institutes of Market Research (Almeida e Wickerhauser, 1991) was used, which categorizes the various family socioeconomic levels by gathering information on the head of the family and the material goods in the household.

### *Questionnaire on drug use to select subjects to the control group*

In order to ensure that the adolescents from the non-user population were not drug dependents or abusers, the questionnaire created by the National Household Survey on Drug Abuse (SAMHSA, 1996; SAMHSA, 1999) was applied, which was translated into Portuguese by Carlini *et al.* (2002).

Information on alcohol and drug experimentation was obtained. The subjects who scored 3 (three) or more positive answers (yes), out of the 6 (six) answers contained in this instrument, were excluded from the sample.

### *Memory Evaluation*

After the selection of participants, the same methodology for memory evaluation was used for both groups.

### *Semantic memory questionnaire (Kihlstrom e Schacter, 1995)*

For the assessment of semantic memory the questionnaire proposed by Kihlstrom and Schacter (1995) was

applied, containing 22 (twenty-two) questions. All of them should be answered taking into consideration the period of time in which each subject was 12 (twelve) years old.

The objective of this questionnaire is to collect information on the recollection or non-recollection of specific situations related to home, school, vacation, and habits. The authors consider that memories are semantic, yet with autobiographical characteristics, because the subject although talking about himself, demonstrates knowledge of the world that is shared within his social environment and attributes meanings and concepts to requests.

The recollections at age 12 were taken into consideration because, according to these authors, around this life period formal operations take place, in other words, the individual is able to abstract and think about all possible relationships and to seek solutions out from hypotheses and not only from observation of reality.

It was made clear to the subject that there was no problem whatsoever if he could not answer some questions and that each question referred to the period of the time he was 12 (twelve) years old. These questions were presented one by one and their answers were recorded for further analysis.

### *Autobiographical memory questionnaire (Borrini et al., 1989)*

The seven-open-question instrument proposed by Borrini *et al.* (1989) was applied.

Subjects were informed that the recollections for this study referred to the period of time until age 15 (fifteen).

The purpose of this questionnaire is to collect information related to events experienced by the subject in different contexts. In this perspective, the questions referred to facts and events that happened in school, at home, to accidents that he or someone of his family had, happy or unhappy remarkable events, diseases he or someone of his family had, the first time he saw someone being taken to a hospital or someone dead, and any event related to games.

The authors of the questionnaire considered three different periods for the assessment of autobiographical memory: from infancy to 15 years of age, from 16 to 40 years of age, and from 41 years of age onwards. The first age range (from infancy to 15 years) was considered for the purpose of this study because it was conducted with adolescents. One must consider that around this age the adolescent has intellectual structures to match up proportions, probabilistic notions, as well as complex and abstract hypothetical deductive reasoning.

It was made clear to the subject that he should talk about facts that occurred when he was less than 15 (fifteen) years old. The questions were presented one by one and their answers were recorded for further analysis.

**Score:** the subject was considered to score 2 (two) points in each question of both questionnaires when he recollected the information requested, 1 (one) point if

he did not recollect, and 0 (zero) point when the question did not apply to him. Statistical Analysis: chi-square  $p < 0.05$ .

### Sample Characteristics

All subjects were single, both groups were equivalent in respect to socioeconomic level (Class C was the most incident), school level ( $p = 0.7757$ ), age (mean age of 15.32 years,  $p = 0.251$ ), and were enrolled in public schools (Table 1). Moreover, no difference regarding the number of subjects who were paid for informal jobs (6 users and 6 non-users) was reported.

Data regarding drugs used by the subjects of the experimental group (percentage of users - age at first use) were: tobacco (92% - 12.17), alcohol (88% - 11.36), marijuana (92% - 12.91), inhaled cocaine (36% - 14.11), smoked cocaine - crack (16% - 13), benzodiazepine or barbiturate (4% - 11), inhalants (8% - 14.5), and hallucinogens (8% - 14).

## Results

Semantic memory questionnaire  
(Kihlstrom and Schacter, 1995)

No question compared one by one resulted in significant statistical difference, however considering the overall questionnaire, the group of drug users presented higher indices of non-recollections than the control group ( $p = 0.0057$ ), as set out in Table 2.

Autobiographical memory questionnaire  
(Borrini et al., 1989)

Only one question resulted in significant statistical difference. The group of adolescent drug users presented lower incidence of recollections for events that happened at their homes when they were children ( $p = 0.041$ ).

The total number of remembrances in the autobiographical memory questionnaire shows that the experimental group had higher scores for non-recollections than the control group ( $p = 0.0205$ ), as set out in Table 3.

## Discussion

Adolescent drug users had more difficulties to access long-term information from both semantic and autobiographical memories as supported by this study.

Semantic memory questionnaire demonstrated that adolescent users presented higher incidence of non-remembrances, although the period of time they were asked to remember was not too distant for recollecting events or situations they knew (such as favorite song). This data might indicate difficulties to access the requested information. Autobiographical memory questionnaire demonstrated that users remembered illnesses they or their family members had, reflecting the access to negative contents. However, it was more difficult for them to talk about personal issues.

The higher incidence of non-remembrances for the group of drug users was observed in events that occurred during their infancy at home and could partially reflect cognitive alterations.

**Table 1.** Academic characteristics of adolescent drug users (n = 25) and non-users (n = 25)

		users		non-users		n	Total	p
		n	%	n	%			
School level	1st degree	12	48%	10	40%	22	44%	0,7757
	2nd degree	13	52%	15	60%	28	56%	
Attendance at school in the last year	Regular	9	36%	24	96%	33	66%	< 0,0001
	Frequent absences	16	64%	1	4%	17	34%	
Grade repetition	Yes	9	36%	23	92%	32	64%	0,0001
	No	16	64%	2	8%	18	36%	
History of school expulsion	Yes	10	40%	1	4%	11	22%	0,0013
	No	15	60%	24	96%	39	78%	

**Table 2.** Semantic memory questionnaire: quantity of recollections and non-recollections of adolescent drug users (n = 25) and non-users (n = 25)

	Group				Total		P value
	users		non-users		N	%	
	N	%	N	%			
Total score: non-recollections	101	19,9	66	12,8	167	16,3	0,0057
Total score: recollections	406	80,1	449	87,2	855	83,7	
Total	507	100,0	515	100,0	1022	100,0	

**Table 3.** Autobiographical memory questionnaire: quantity of recollection and non-recollections of adolescent drug users (n = 25) and non-users (n = 25)

	Group				Total		P value
	users		non-users		N	%	
	N	%	N	%			
Total score: non-recollections	37	21,1%	20	11,4%	57	16,3%	
Total score: recollections	138	78,9%	155	88,6%	293	83,7%	<b>0,0205</b>
Total	175	100,0%	175	100,0%	350	100,0%	

White (2005) found that alcohol abuse and dependence cause alteration in hippocampus functioning and consequently the consolidation of new autobiographical memories. Similarly, Eiber *et al.* (1999) found lesser number of autobiographical events and memory specificity in the assessment of the autobiographical memory of opium users. These authors suggest that such impairment may be the consequence of drug toxic effect on the central nervous system and presence of affective problems.

O'Connell e Lawlor (2005) established the relationship between alcohol dependence and suicidal ideation with cognitive deficits, among them the decrease of specificity of autobiographical memory. Mackinger *et al.* (2004) studied the autobiographical memories of 65 alcohol-dependent patients and also observed generalized characteristics of autobiographical memory during detoxification period.

Although the main objective of this study is the investigation of autobiographical and semantic memory in adolescent drug users, it is not objectively possible to associate the results exclusively to the toxic effects of drugs on the central nervous system. Other hypotheses regarding these results have to be taken into consideration and be better investigated in future studies.

The use of drugs in adolescence may impair the phase of discovery and search for new experiences, common in this period of life, modifying the acquisition of general and specific autobiographical memory and world knowledge.

Users tend to talk directly about facts and events related to drugs, to the use itself and to other users, diminishing or excluding the access to new information and situations. Thus, one may infer that adolescent drug users ignore part of their life experiences because they do not give importance to experiences not directly related to drugs. Both personal and shared experiences within family and social environments are lost and disregarded.

Under this perspective, one may state that personal events, facts and episodes occurred prior to the onset of drug use became less relevant, and therefore were remembered with more difficulty or with less efficiency and specificity. These facts probably contribute to the process of individuality loss, mainly if one considers that the user is an adolescent whose identity is being shaped.

As a result, this study also indicates that adolescent drug users, in a closed-question approach, tend to remember less efficiently what happened in specific periods of their lives compared to adolescent non-users.

The conjunction of some factors seems to better justify the present data: adolescent drug users have some difficulty to access information due to inadequate cerebral functioning, they have difficulties to talk about personal remembrances occurred in the past due to the negative character of the events, facts and episodes they had experienced.

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