Motivational Changes of Cannabis Use Prior to and During the Course of Schizophrenia

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Background and Objectives: We investigated subjective reasons/motivation for cannabis use in patients with schizophrenia ($n = 51$) compared to otherwise healthy cannabis users ($n = 109$). Moreover, we explored possible changes in the motivational patterns of both groups over time.

Methods: A questionnaire was developed with six dimensions of motivations to use cannabis: *affect regulation*, *relaxation*, *habit*, *structuring everyday life*, *creativity*, and *sociability*. Participants filled out the instrument regarding their present and initial use of cannabis.

Results: At the time of onset of consumption, groups only differed significantly in *habit* with higher ratings for patients with schizophrenia and cannabis use (SCH+CAN group) and in *sociability* with higher ratings for otherwise healthy users (CAN group). In respect of present use, the motivation to consume cannabis was significantly higher for *affect regulation* and *structuring everyday life* in the SCH+CAN group and for *relaxation* and *sociability* in the CAN group. With reference to time-based variations, the SCH+CAN group reported increased relevance of *structuring everyday life* over time. Furthermore, the CAN group reported increased importance of *habit* over time, whereas the SCH+CAN patients showed decreased ratings of *habit* over time.

Conclusions and Scientific Significance: Our findings must be considered preliminary because of the retrospective nature of the assessment. Nevertheless, the present study provides an indication of the time-dependent variation of cannabis-use motivation in schizophrenia, which may provide a better understanding of the functions of cannabis use within the population. Results argue for specific motivational based interventions for the group of schizophrenia patients with regular cannabis use. (Am J Addict 2016;XX:1–7)

INTRODUCTION

Cannabis use is highly prevalent among patients with schizophrenia, particularly in young patients,[1–3] as well as in male individuals and in first-episode patients.[4] Consumption of cannabis is linked to poor long-term rehabilitation outcomes[5–8] and more frequent relapses.[9] Patients may choose to use cannabis in order to reduce specific psychiatric symptoms or side effects of medication,[10,11] or they may use drugs in order to regulate affective states and diminish dysphoria (affect regulation hypothesis).[12]

However, the empirical support for both hypotheses is weak,[13–15] and findings from different studies are heterogeneous. Various studies tend toward affect regulation motives (eg, to reduce anxiety or depression).[16–19] Some authors reported that patients with schizophrenia were more likely to use cannabis in order to regulate internal factors like improving their mood and coping with negative affects, while healthy users smoked cannabis for relaxation and socializing or because of peer pressure.[17,20] In another study, patients with schizophrenia reported using cannabis for enhancement of social skills more often than controls.[16]

Compared with healthy users, patients with psychosis were less likely to use cannabis out of habit or as part of a routine.[17] In contrast, other authors reported that patients with schizophrenia used cannabis for similar reasons as otherwise healthy controls.[13,21,22] According to a review, reasons for cannabis use in patients with schizophrenia are complex and include both relief of dysphoria (eg, to relief boredom, to avoid depression) and enhancement of positive affect, as well as social enhancement (eg, to fit in with others, to be talkative).[23] Hames et al.[24] point out to the social context as an important factor regarding cannabis consumption in a psychotic sample. Thus, cannabis may be used in order to maintain or develop social links. Likewise, Schofield et al.[19] state that 81% of their psychotic sample used cannabis in order to do something with friends. As with healthy controls, relaxation seems to be a common reason for cannabis consumption also among people

with schizophrenia.[16,25,26] Further to relaxation, social or emotional reasons cannabis may also be used in order to enhance creativity or functional aspects. Some studies report the aim for increased creativity by use of cannabis, for example, to be more creative,[16] to feel more emotions, or to give one more thoughts.[25] Several studies state that patients with schizophrenia consume cannabis for organizational and functional reasons (eg, to increase energy, to enhance concentration, to work better).[16–18,27]

It is possible that motivation to use cannabis changes over time and over the course of the disorder, and that these changes may partly account for the heterogeneity of results from different studies. Studies with longitudinal design are most appropriate in order to address this question; however, longitudinal studies are difficult to realize, and to our knowledge, no such study has been published to date. In the present study, we obtained information from patients with schizophrenia and regular cannabis use about subjective reasons for their past and current cannabis use. Despite the methodological problem of retrospective accounts, we thought that the study might give us first hints on possible motivational shifts over time. To our knowledge, this is the first study to address the time dependency of subjective motivation/reasons to use cannabis in patients with schizophrenia.

MATERIALS AND METHODS

The study was carried out in compliance with the latest revision of the Declaration of Helsinki and was approved by the local ethics committee of the Medical Faculty of the University of Cologne. Following a detailed study-description, a written, informed consent was obtained from all participants.

Subjects

The clinical sample (SCH+CAN group) consisted of 51 in- and outpatients of the Psychiatric University Hospital and the LVR-Hospital of Cologne. Patients were included in the study, if they met the following criteria: (1) Diagnosis of schizophrenia (according to DSM-5)[28] and regular cannabis use (at least one cannabis-joint per month). (2) At the time of onset of cannabis use, patients did not suffer from any neuro-psychiatric disorder (no psychiatric diagnosis or treatment up until that time). (3) Patients were informed of the study and gave their consent in writing. The control group (CAN group) consisted of 109 otherwise healthy regular cannabis users (at least one cannabis-joint per month). They were recruited at music-clubs and public parties. Exclusion criteria for both groups were as follows: (1) Any further relevant neuropsy-chiatric disorders, especially additional substance abuse disorders. (2) No compliance with the requirements of the study. (3) Incapability or refusal to give an informed consent.

Procedures and Measures

First, we developed an instrument to assess motivation for cannabis use (Cannabis Use Motivation Scale = CMS) using theory-based scaling.[29] We conducted a systematic literature search of the Pubmed, PsycINFO, and PsycARTICLES database (search terms: reasons, motivation, cannabis use, psychosis, schizophrenia). We identified five investigations with a high methodological standard on reasons/motivation for cannabis use in patients with schizophrenia and otherwise healthy cannabis users.[14,16,17,19,23] Based on these studies and our own clinical experience, as well as interviews with cannabis users (with and without schizophrenia), we developed an initial version of the CMS, which consisted of 42 items. Thereafter, the items were modified and fine-tuned in interviews with cannabis users. The final version of the CMS consists of 37 items. Participants had to rate each item on a Likert-scale with seven graduations (CMS is available on request).

All participants were first asked to fill out the CMS, specifically referring to the time of their initial cannabis experience. They were then asked to rate the same items referring to their current cannabis usage. In addition to the CMS, we performed detailed interviews with all participants regarding demographics and the patterns of drug use. This included determining their age at the time of initial cannabis use, and time since most recent cannabis use, as well as the dose and frequency (joints per month). For the group of psychiatric patients, we also performed a structured interview to verify clinical diagnoses according to DSM-5 (SCID I; APA) and an additional detailed interview regarding psychi-atric medication and age of onset of schizophrenia. Psychotic and depressive symptoms were assessed using the Brief Psychiatric Rating Scale (BPRS)[30] and the Montgomery Asberg Depression Scale (MADRS).[31] Side effects of psychiatric medication were determined using Udvalg for Kliniske Undersogelser (UKU) Side Effect Rating Scale.[32] Finally, patient data were verified in personal interviews with the attending psychiatrist, as well as by analyzing patient records, where clarification was necessary.

Statistical Analyses

Demographic variables between groups were compared using chi-square tests for categorical variables and indepen-dent t-tests for continuous variables.

In order to determine dimensions of motivation to use cannabis out of the CMS-items, we performed an exploratory factor analysis with the principal axis factoring method, varimax rotation and Kaiser normalization. Analyses extracted a six-factor solution accounting for 54.5% of the variance in scores. All factors were deemed to be interpretable and were labeled based on face validity as follows:

(1) *affect regulation* (eg, to control feelings, to relief sadness, to decrease inner emptiness, to cope better with frighten-ing thoughts, to cope better with frightening sensations)
(2) *relaxation* (eg, to relax, to be less nervous, to sleep better)
(3) *habit* (eg, to smoke cannabis simply because it́s available, to smoke cannabis because it was common in the clique)
(4) *structuring everyday life* (eg, to have more energy, to manage everyday life, to concentrate better)

TABLE 1. Demographic data and patterns of cannabis use

	SCH+CAN (n = 51)	CAN (n = 109)	Statistical value	p-value
Gender (male/female)	38/13	87/22	.008[a]	.927
Age in years (mean, SD)	27.63 (6.71)	23.93 (3.77)	3.299[b]	**.002***
Level of education (none/elementary school degree after grade 9/ intermediate school degree grade 10/A-level grade 13/university degrees)	3/9/23/14/2	1/3/31/61/13	19.712[a]	**≤.001*****
Age at onset of cannabis use (years, mean and SD)	16.63 (2.63)	17.13 (2.22)	−1.152[b]	.251
Duration of regular cannabis use (years, mean and SD)	8.30 (7.82)	5.37 (3.91)	2.292[b]	**.026***
Frequency of consumption (n = <1×/month/1×/month/1×/week/3×/ week/1×/day/>.1×/day)	2/3/7/17/13/9	2/4/14/28/28/33	−.956[b]	.345

SCH+CAN, patients with schizophrenia and cannabis use; CAN, controls with regular cannabis use; p-level, level of significance; bold p-value, statistical significance below 5%; p-values with asterisk symbols: *level of significance ≤ 0.05; **level of significance ≤ 0.01; ***level of significance ≤ 0.001; SD, standard deviation.
[a]Chi-square value displayed; [b]T-value displayed.

(5) *creativity* (eg, to feel more creative during certain activities, to increase perception of music/pictures)

(6) *sociability* (eg, to be more sociable with friends, to have more fun with friends, to feel closer to other people).

We compared the motivation for cannabis use between groups (SCH+CAN vs. CAN) and regarding time-based changes (past vs. current use) by means of multivariate analyses of variance (MANOVA) with repeated measurements. Main effects of group (SCH+CAN vs. CAN) and time (repeated measurements: past vs. current use) and interaction effects (group × time) were determined and post-hoc tests were calculated when appropriate. Finally, the six CMS-dimensions were correlated with demographics, specific patterns of consumption (both groups), and psychopathological parameters (SCH+CAN group) using two-tailed Pearson's correlations.

The level of significance was adjusted to 5% and corrected according to Bonferroni. All procedures were performed using SPSS version 21 (SPSS, Inc., Chicago, IL).

RESULTS

Demographic Variables and Patterns of Cannabis Use

Results are summarized in Table 1.

Both groups were similar regarding gender, with males being predominant in each group. Significant group differences were found for age (SCH+CAN patients averaged four years older), education (higher education within the CAN group), and mean duration of regular cannabis use (longer duration within the SCH+CAN group).

Clinical Variables of SCH+CAN Patients

Parameters of psychopathology, course of disease (schizophrenia), medication, and side-effects are presented in Table 2. The presence of psychotic or any other neuropsychiatric symptoms in all patients were negated at onset of cannabis consumption.

TABLE 2. Clinical data of SCH+CAN patients

	SCH+CAN (n = 51)
Time elapsed from onset of consumption to diagnosis with schizophrenia (years, mean and SD)	6.00 (4.31)
Mean age at onset of diagnosis with schizophrenia (years, mean and SD)	22.70 (3.88)
Time since diagnosis with schizophrenia (years, mean and SD)	5.02 (5.21)
Number of psychotic episodes (mean and SD)	4.1 (4.58)
BPRS-Score (mean and SD)	39.24 (9.54)
MADRS-Score (mean and SD)	16.1 (5.36)
Type of medication (none/Atyp/Atyp&AD/Atyp&MS/Atyp&AD&MS/Atyp&Typ)	0/39/5/4/1/2
UKU scale 1 (mean and SD)	5.67 (3.26)
UKU sum (mean and SD)	7.12 (4.4)
UKU subjective (mean and SD)	1.24 (.83)

SCH+CAN, patients with schizophrenia and cannabis use; SD, standard deviation; BPRS, Brief Psychiatric Rating Scale; MADRS, Montgomery Asberg Depression Scale; Atyp, atypical antipsychotic; AD, antidepressant; MS, mood stabilizer; Typ, typical antipsychotic; UKU, Udvalg for Kliniske Undersogelser Side effect rating scale.

Subjective Motivation/Reasons for Cannabis Use

For a graphic presentation of the data, see Fig. 1.

In summary, the main effect of group was significant for *relaxation* (factor 2, $F_{1,133} = 6.89$, $p = .01$), and *sociability* (factor 6, $F_{1,133} = 22.23$, $p = <.001$). The main effect of time was significant for *habit* (factor 3, $F_{1,133} = 5.42$, $p = .021$). The interaction group × time was significant for *affect regulation* (factor 1, $F_{1,133} = 7.24$, $p = .008$), *relaxation* (factor 2, $F_{1,133} = 7.32$, $p = .008$), *habit* (factor 3, $F_{1,133} = 21.54$,

$p = <.001$), and *structuring everyday life* (factor 4, $F_{1,133} = 8.51$, $p = .004$). Inspection of the data in Fig. 1 suggests that the two groups show opposing trends over time for the dimensions *affect regulation*, *relaxation*, *habit* and *structuring everyday life*.

In the within-subject post-hoc tests, the CAN group shows a significant increase of the impact of *habit* ($t_{94} = -2.334$; $p = .022$) over time. In contrast to the CAN group, the impact of *habit* decreases ($t_{39} = 3.497$; $p = .001$) over time in the

FIGURE 1. Motivation for cannabis use at onset of use and at present.
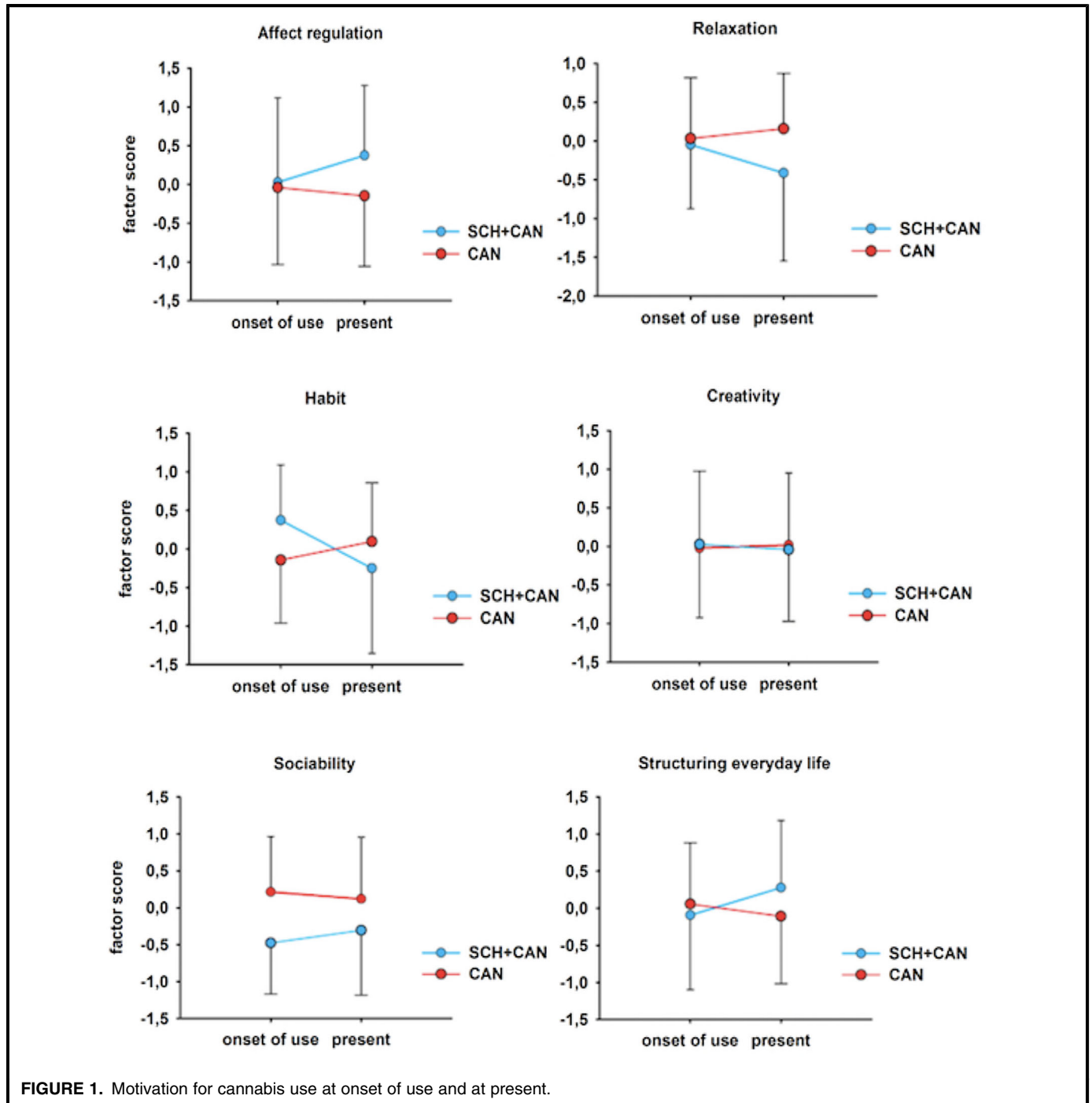
SCH+CAN group. Finally the SCH+CAN group shows significant increase of the impact of *structuring everyday life* ($t_{39} = -2.273$; $p = .029$) over time.

Results of the between-subject post-hoc tests suggest that at the onset of cannabis consumption the impact of *habit* ($U = -4.124$; $p = \leq .001$) is higher in the SCH+CAN as compared to the CAN group. For current use, the impact of *affect regulation* ($t_{133} = -2.960$; $p = .004$) and *structuring everyday life* ($t_{133} = -2.126$; $p = .035$) is higher in the SCH+CAN vs. CAN group, whereas the impact of *relaxation* ($U = -2.635$; $p = .008$) is lower in the SCH+CAN group.

Correlations Between CMS-Dimensions, Demographics, Psychopathology, and Patterns of Cannabis Use

SCH ± CAN group: *Age at first use of cannabis* is negatively associated with the dimension *affect regulation* ($r = -.327$; $p = .04$) for present use. Furthermore, a longer duration of cannabis use highly correlates with the *number of inpatient treatments* ($r = .741$; $p \leq .001$).

CAN group: *Age at first use of cannabis* is negatively correlated with the dimension *structuring everyday life* ($r = -.253$; $p = .01$) and *socializing* ($r = -.209$; $p = .034$) for present use.

DISCUSSION

People with schizophrenia may use cannabis for different reasons. Many studies concerning cannabis use have shown contradictory results, offering reasons such as fun and leisure or aspects pertaining to self-medication or affect regulation. Possible time-based variations of the motivation for cannabis consumption have not yet been addressed in the literature, and this might account for some of the contradictory findings. In the present investigation, we analyzed subjective reasons for cannabis use in patients with schizophrenia along with an otherwise healthy control group and we addressed the question of motivational changes over time. For that reason, we developed a questionnaire (Cannabis Use Motivation Scale = CMS) with six dimensions (*affect regulation*, *relaxation*, *habit*, *structuring everyday life*, *creativity*, and *sociability)*. Patients and healthy users were asked for a retrospective rating of their motivation to use cannabis, when they started to use it, followed by an assessment of current motivation.

At onset of cannabis consumption, both groups only differed in the factor *habit* with higher ratings for the SCH+CAN group, and in the factor *sociability* with higher ratings for the CAN group. Regarding the onset of consumption, the higher ratings in the CAN group for *sociability* are in line with Green et al.,[17] whereas the higher ratings in the SCH+CAN group for *habit* are not. Except for the two factors *habit* and *sociability*, the findings of our study suggest that both groups used drugs for similar reasons at onset of consumption.

With reference to current use, the motivation to consume cannabis was significantly higher for *affect regulation* and *structuring everyday life* in the SCH+CAN group, and for *sociability* and *relaxation* in the CAN group. The higher ratings for *sociability* and *relaxation* for current use in the CAN group are in line with Green et al.[17] In regard to *sociability*, Saddichha et al.[20] furthermore state that dual-diagnosed patients (SCH+CAN) tend to consume cannabis more often alone than otherwise healthy controls with substance use (CAN).[20] One possible explanation for this solitary drug-taking behavior might be that patients with psychosis use cannabis in order to regulate internal factors such as those portrayed in the dimension *affect regulation* rather than using the drug for social reasons.[20] Except for the two factors *habit* and *creativity*, our findings suggest for current use, that both groups consume cannabis for different reasons. The increased ratings for *affect regulation* in the SCH+CAN group are in line with the hypothesis of affect regulation.[12] Increased dysphoria in the context of schizophrenia may explain cannabis use for *affect regulation*, at the expense of other dimensions, especially *relaxation*.

Regarding time-based variations of the motivation to use cannabis, the major finding was an opposing trend for the dimensions *habit* and *structuring everyday life* in the two groups. SCH+CAN patients reported increased relevance of *structuring everyday life* over time, which might stand for the attempt to compensate possible disorganization phenomena experienced by some schizophrenic patients. Furthermore, the CAN group reported increased importance of *habit* over time, whereas the SCH+CAN patients showed decreased ratings for *habit* over time. These findings are in line with Green et al., suggesting that patients with psychosis are less likely to use cannabis out of habit or as part of a routine, compared to healthy controls.[17] The findings of our study indicate time dependent changes of subjective motivation/reasons for cannabis consumption in patients with schizophrenia, which may partly account for the heterogeneous results in the literature.

In the SCH+CAN group, there was a negative correlation between the age at first use of cannabis and the CMS dimension *affect regulation* for present use, which is in line with findings from Arseneault et al.[33] Additionally, the high correlation between a longer duration of cannabis use and the number of inpatient treatments is consistent with findings from van Dijk et al.[9] In the CAN group, there was a negative correlation between age at first use of cannabis and the CMS dimension *structuring everyday life* for present use, which is in alignment with Meier et al.[34] Accordingly, the neuropsychological decline (eg, executive functions, processing speed, memory) was global and concentrated among adolescent-onset cannabis users, with more persistent cannabis use associated with greater cognitive impairment, due to possible adverse effects on the developing brain. Furthermore, persistent cannabis use interfered with everyday cognitive functioning.

Overall, patients seem to use cannabis for both hedonistic pursuit and for reduction of distress. However, the latter motivation gains importance after the manifestation of the schizophrenic disorder.

Altogether, cannabis use may function as a short-term aid to regulate negative affects and dysphoria in the context of schizophrenia, whereas otherwise healthy users may sustain the hedonistic aspects of consumption over a period of years. Hence, in the subjective experience of patients, the immediate positive effects of cannabis outweigh its delayed negative impact during the course of the disorder. Consequently, psychotherapy for patients with schizophrenia and persistent cannabis use needs to focus on motivational aspects—the motivation to reduce the drug use and to acquire skills for affect regulation in order to replace the function of cannabis use.[35] Successful training of such skills may result in reduced consumption and a more favorable global outcome of schizophrenia.

Finally, several important limitations of this study have to be acknowledged. First, retrospective ratings generally provide risks concerning the validity of data. Notably, patients with schizophrenia and cannabis users may be vulnerable to memory bias; both are associated with neuropsychological decline. Particular, data concerning the time lag between the onset of cannabis use and the beginning schizophrenia may be doubtful, because of the sometimes long period of unspecific early symptoms of the psychotic prodrome. So, we finally cannot preclude that at least some patients suffered from first subtle psychotic symptoms, when they started using cannabis. Second, the sample size was small and this can skew the results. Hence, larger studies with longitudinal designs are needed in order to confirm the present results.

In conclusion, the present study has important methodological limitations. Nevertheless, it does suggest that patients with schizophrenia and otherwise healthy subjects use cannabis for partly different reasons. Results indicate the use of cannabis for affect regulation in patients with schizophrenia, arguing for specific motivational-based therapeutic interventions.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

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