

BRIEF COMMUNICATION

Effects of Smoked Marijuana on Human Social Behavior in Small Groups

RICHARD W. FOLTIN¹ AND MARIAN W. FISCHMAN

*Division of Behavioral Biology, Department of Psychiatry and Behavioral Sciences
The Johns Hopkins University School of Medicine, Baltimore, MD 21205*

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FOLTIN, R. W. AND M. W. FISCHMAN. *Effects of smoked marijuana on human social behavior in small groups.* PHARMACOL BIOCHEM BEHAV 30(2) 539-541, 1988.—Six adult male research volunteers, in two groups of three subjects each, lived continuously in a residential laboratory for seven consecutive days. Subjects' behaviors, including social interaction and coaction, were continuously recorded. During the first part of the day (0945-1700), subjects remained in their private rooms doing work activities. During the remainder of the day (1700-2345), they had the option to socialize with the other subjects. Four cigarettes containing active marijuana (2.7% Δ^9 -THC w/w) or placebo were smoked daily: two during the work period, and two during the social access period. Active marijuana had no effect on the total amount of time that subjects spent in the social area. However, active marijuana changed the distribution of activity within the social area by decreasing the amount of time subjects spent engaging in verbal exchanges, i.e., interaction, while simultaneously increasing the amount of time that subjects engaged in the same activity, but in the absence of verbal exchanges, i.e., coaction.

Marijuana Social behavior Humans

PREVIOUS experimental studies on the effects of smoked marijuana on social behavior have reported both increases in social interaction [8,10] and decreases in interaction accompanied by increases in coaction, i.e., independent participation in identical activities without verbal exchanges [1, 2, 9]. We have previously [6] reported that in small groups with low baseline levels of social interaction increases in social interaction did not occur, but did occur in other experimental groups. In that study, the available social activities, e.g., game-playing, were not readily associated with coaction, and failure to find changes in coaction may have been a function of low baseline amounts of the behavior. The present paper extends the analysis of the effects of smoked marijuana on social behavior to situations which are more frequently associated with coaction, e.g., watching videotaped movies.

METHOD

Subjects

Two groups of three healthy adult male research volunteers ranging in age from 19 to 30 years participated. All six subjects had histories of marijuana use ranging from 2-3

cigarettes per week to 2-3 cigarettes per day. Subjects received complete medical and psychiatric examinations, signed consent forms detailing all aspects of the research, and were paid for participation.

Laboratory

Research was conducted in a residential laboratory designed for continuous observation of human behavior over extended periods of time. The facility consisted of six rooms connected by a common corridor. Three identical private rooms were similar to small efficiency apartments with kitchen, bathroom, desks, and sleeping areas. A common social area had a recreation room, an exercise room, and a bathroom. The recreation room contained kitchen facilities, lounge furniture, games, puzzles, a videogame system, and a monitor dedicated to a video-cassette player. The exercise room contained exercise equipment and laundry facilities. A detailed description of the laboratory has been published elsewhere [4].

Video and audio equipment throughout the residential facility was interfaced with a monitoring system in an adja-

¹Requests for reprints should be addressed to Richard W. Foltin, Ph.D., Department of Psychiatry and Behavioral Sciences, The Johns Hopkins University School of Medicine, 600 N. Wolfe St., Houck E-2, Baltimore, MD 21205.

cent control room. Subjects were continuously observed except in private dressing and toileting areas. A computerized observation program [3] provided a continuous recording of each subject's behavior in categorical form. Subjects were instructed that communication between them and the experimenters via a networked computer system was to be kept to a minimum. No other outside communication was permitted.

Standard Day

The day was divided into two periods: a private work period, and a period of social access. Subjects were awakened at 0900, given an opportunity for breakfast, had a work period from 0945 to 1700 followed by a social access period which lasted from approximately 1700 to 2345. During the social access period, each subject was permitted to remain in his own private room engaging in private recreational activities (e.g., reading) or to enter the social area and participate in social activities including watching videotapes of popular movies. Subjects were not allowed in each other's rooms and social activities were available only in the social area during periods of social access.

Drug Administration

Cigarettes containing 0% (w/w; placebo) 1.3% or 2.7% (w/w) Δ^9 -tetrahydrocannabinol, supplied by The National Institute on Drug Abuse, were smoked using a uniform puff procedure cued by stimulus lights located in each private room and in the main social room. This paced smoking procedure for marijuana administration produces reliable increases in heart rate [7], food intake [5] and social interaction [6]. Onset of the first light signalled that subjects should light the cigarette with minimum inhalation, and then wait for 30 seconds. A series of four lights signalled a five-second inhalation followed by a 10-second breath hold, an exhalation, and a 45-second rest. This procedure was repeated for five inhalations, and in most cases resulted in pyrolysis of the entire cigarette. Subjects smoked placebo or active marijuana cigarettes in their individual rooms at 0945 and 1315 during the private period (0945–1700), and together in the social area at 1700 and 2030 during the social access period (1700–2345). Subject 3 in the second group was more sensitive to active marijuana than the other subjects and, on active drug days, he smoked cigarettes containing 1.3% (w/w) Δ^9 -tetrahydrocannabinol, while the remaining five subjects smoked the higher potency cigarettes. The social interaction data included in the present analyses were collected according to the following schedule. Group 1 subjects smoked active marijuana cigarettes on days 5 through 7 and placebo cigarettes on days 2 through 4. Group 2 subjects smoked active marijuana cigarettes on days 2 through 4 and placebo cigarettes on days 5 through 7.

Descriptive Statistics

Social behavior was defined by the presence of two or more subjects in the social area, and was divided into interaction and coaction. A social interaction was defined by the presence of two or more subjects in the social area engaged in a vocal exchange [2]. A coaction was scored whenever two or more subjects were in the social area in the absence of verbal exchanges [2]. Daily total social interaction times and daily total coaction times were recorded for each subject individually in each group. Data were analyzed using a two-factor repeated measures analysis-of-variance

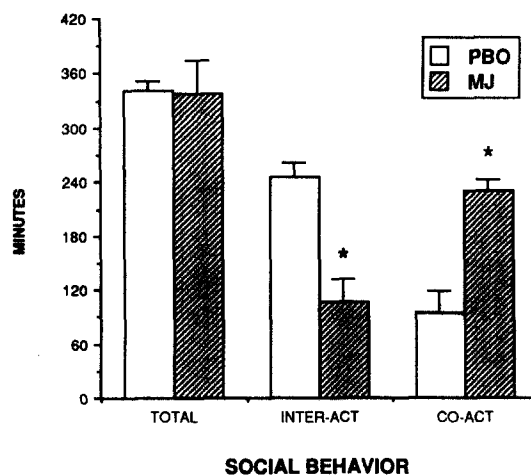


FIG. 1. Mean amount of total social behavior, categorized as interaction (INTER-ACT) or coaction (CO-ACT), during daily social access periods as a function of placebo and active marijuana administration. Error bars indicate standard errors of the mean, and asterisks indicate a significant difference between placebo and active marijuana administration ($p < 0.001$).

with drug (placebo versus active marijuana) as the first factor, and day of dosing (1 through 3) as the second factor. One ANOVA was calculated using total social behavior times, and another ANOVA was calculated using the proportion of the total social behavior time that was scored as coaction. Results were considered statistically significant if $p < 0.05$.

RESULTS

All subjects readily adapted to living in the residential laboratory. Figure 1 compares the mean total amount of time that each subject spent in the social area with other subjects and the breakdown of this time into interaction and coaction. There was no significant difference in total social behavior time between placebo and active marijuana administration, nor did total social behavior change as a function of day of each condition. Under both placebo and active marijuana conditions, each subject, on average, spent nearly six hours (93% of the available time) of each social access period in the social area in the presence of at least one other subject. Three video-taped movies were requested by the subjects each evening under both placebo and active drug conditions. Administration of smoked active marijuana significantly decreased the amount of time each subject spent engaging in verbal exchanges by nearly two hours, and since there was no change in the total amount of social behavior, time spent with one or both of the other subjects in the absence of verbal exchanges (coaction) was correspondingly increased. This increase in the proportion of social behavior that was scored as coaction from 26% under placebo conditions to 71% under active marijuana conditions was statistically significant, $F(1,5) = 204.4$, $p < 0.001$.

DISCUSSION

The results of this experiment show clearly that under certain conditions the effects of smoked marijuana on social interaction and coaction can be differentiated. In the presence of an extremely high baseline amount of social behavior, active marijuana had no effect on total time spent engag-

ing in social behavior. However, active marijuana significantly altered the pattern of social behavior by decreasing interaction and increasing coaction. In a previous report from this laboratory [6] videotape viewing was not an option and the baseline levels of social behavior varied widely among four groups of subjects. Under those conditions nearly all of the social behavior consisted of interaction, with little or no coaction, and the effects of smoked active marijuana were dependent on the baseline amounts of interaction and coaction. Active marijuana did not increase either interaction or coaction in groups characterized by small baseline amounts of those activities. In the current study, where social behavior consisted of significant amounts of both interaction and coaction, active marijuana decreased the amount of social behavior categorized as interaction, increasing the amount of social behavior categorized as coaction.

The increase in coaction reported here replicates previous reports [2,9] that smoked marijuana increased the amount of time individuals spent in social settings participating in identical activities without verbal interaction. In these studies, as in the present report, participants had access to activities, i.e., television and group music options, that are associated with coaction. Thus, it is possible that the effects of marijuana are specific to the current stimulus conditions, decreasing the probability of verbal behavior while subjects are concurrently listening to music or watching video-taped

films. Regardless of the mechanism of this effect of marijuana on social behavior, however, the increase in the proportion of coaction time (and the concomitant decrease in interaction time) was substantial and consistent across all subjects.

The importance of baseline amounts and type of activities in determining the effect of smoked active marijuana on social behavior was also demonstrated by the failure to see increases in total time engaged in social behavior. Under placebo conditions participants were spending nearly the entire social access period together in the social room, and under these conditions, further increases were unlikely to occur. Thus, the reported inconsistencies in the effects of marijuana on social behavior are due, at least in part, to the different types of social activities used among experiments. All of the previous laboratory studies have either compared a single dosage of marijuana to placebo [1, 2, 6, 9], or have not controlled for daily fluctuations in dosage [8,10]. Systematic manipulation of dosing under the controlled conditions described here will provide further information about factors contributing to the difference in the results of studies on the effects of marijuana on social behavior.

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