Arch.gen.Psychiat. 9,566-574 (1963). LSD 118

Exploratory Study of Drugs and Social Interaction

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Background of the Study

The development of sensitive and relevant measures of behavioral changes in relation to drug administration is crucial to the advancement of theoretical knowledge and therapeutic efficacy in the area. Exploration of the relationship between drug administration and social behaviors in small groups presents complex problems of contingent variables. However, it offers on a gross level objective measures of behavioral changes of the individual in a social situation and on a more subtle level measures of alterations in group processes associated with drug administration. Further, such research can draw upon a variety of concepts and techniques developed by social psychologists working in the small group area. In the present exploratory study, the Bales Interaction Process Analysis technique [2] is used to examine alterations in individual and group behaviors in a continuing four-person group with sequential administration of a powerful, short-acting drug, *N,N*-Diethyl-D-lysergamide (LSD-25).

This technique involves the setting up of small discussion groups to whom a task is presented, usually the solution of a human relations problem, which is to be accomplished in a set time period by the discussion of the group members. The behaviors of the group in orienting themselves to the problem, evaluating the situation, and coming to a decision are recorded, either by actual observation, or later in the case of the tape recording, with a set of categories (12 in the Bales system) which were developed in order to encompass the activities of the group in organizing themselves to accomplish the joint task. Thus the categories include for instance; No. 4, Gives Suggestion; No. 11, Shows Tension; and No. 12, Shows Antagonism, etc. From this coding of the behaviors of the group members, profiles of the interaction of each person in terms of number of interacts in each category and number of total interacts for the time period under study can be obtained. With such a procedure it would therefore be possible to determine, for instance, that Person A of an experimental group shows 20 interacts in category 12 (shows antagonism) under Drug X, no interacts in category 12 under Drug Y and four interacts in category 12 under placebo.

However, despite the seeming attractiveness of this method in terms of clear-cut observational data regarding significant behavioral changes in relation to drug administration, few investigators to date have reported drug studies which have made use of it. Lennard and Abramson have studied patterns of interpersonal communication under LSD-25 with normals [10] and with schizophrenics.[1] Takala, Pikhanen and Markhanen [15] have studied the effects of alcohol upon interpersonal behaviors, while Freedman et al [9] have studied changes in the interactions of hospitalized patients in psychotherapy groups under the influence of promazine hydrochloride. The difficulty has been noted by Nowlis in a comprehensive survey [12] of the traditional techniques available for the study of the effects of drugs upon social behavior in group settings. He suggests such studies are subject to many sources of variance which may be unmeasured, uncontrolled, uncontrollable and/or

Submitted for publication Feb 13, 1963.

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interactive. Thus this method presents at once rich promise and more than its share of pitfalls.

Let us review some of the problems facing the investigator who wishes to use this technique to evaluate changes in interpersonal behaviors in relation to drug administration and consider how some of the difficulties might be ameliorated.

In the first place, the interaction characteristics of groups have been found to vary with such situational features as type of task,[14] size of group, etc.[3] The investigator can, however, work with highly standardized and constant interaction settings in order to limit the influence of such extraneous variables.

Small group studies have indicated that under rigorously controlled conditions the interaction characteristics of individuals tend to be constant when sampled at different points of time [11,6] and in the context of reconstituted groups.[5] However, the degree of constancy of interaction characteristics becomes very important in the establishment of baselines from which to measure change. One possible approach to this problem in the study of the effects of short-acting drugs at least would be to broaden the baseline by repeated nondrug or placebo sessions throughout the course of a series of drug sessions.

The use of continuing groups thus becomes necessary in order to broaden baselines. It is also necessary in order to provide measures of changes in behavior associated with various types of drugs and with different dosages of the same drug. Reaction to drugs can be a highly individual affair; thus it is necessary to repeat measurements on the same group of individuals under the conditions which are to be studied. Indeed, it may be advisable to repeat drug sessions at any dosage on a group in order to study for and counteract variability in reaction of the individual to any drug or dosage thereof. However, in Freedman's study [9] of the interaction in a psychotherapy group over a period of several weeks in relation to promazine administration it was found that group process changes over time could not be discounted as a source of alterations in behavior unrelated to the drug effects. Thus, it becomes necessary to design drug studies using continuing groups in which the effects of such group process changes can be examined and controlled for.

The present study explores the use of a continuing four-person group to measure changes in interpersonal behavior in relation to doses of a short-acting drug. This study represents one of a series of exploratory studies in the area in which the hallucinogenic drug LSD-25 was chosen because it has been shown to have a powerful and dramatic effect upon behavior while the effects have been found to vary at different dosages. Thus, at small dosages, increase in tension has been noted; at higher dosages, depersonalization and withdrawal may occur.

A highly standardized and constant interaction setting was used. Further, the study was designed to provide a broad baseline from which to measure change as well as a control for group changes over time by the judicious use of placebo sessions throughout the series. As it was felt to be of interest to study the effects of a drug administered to one individual only in a group (the others having placebo) in contrast to the situation where all group members received the drug together, this contrast also was included in the design.

The following hypothesis with regard to the effects of LSD-25 was tested: The interaction of the subjects in terms of the interaction categories would differ when they had been administered LSD-25 from their interaction when they had not been administered the drug.

And, additionally, the study was designed to examine two primarily methodological considerations:

1. The interaction of the subject in terms of the interaction categories in sessions where he alone received the drug would differ from that in sessions where all received the drug.
2. The interaction of the subjects in sessions where no group member received

the drug would differ from that in sessions where another group member received the drug (secondary effects of the drug).

Method of Procedure

Subjects.—The subjects were chosen from a group of reformatory inmates housed at the New Jersey Neuro-Psychiatric Institute. They were all aged 23-25 years and so far as possible within six months of parole so that they might be available for several months.

Selection Procedures.—A list of suitable subjects was provided by the prison authorities. Each subject was given a Wechsler Intelligence Quotient Test and the Minnesota Multiphasic Personality Inventory. A careful history was taken to determine past instances of mental instability. Neurological and physical examinations were made. The most intelligent, mentally sound, and physically healthy subjects were then asked to participate as volunteers. The researchers tried to select the most homogeneous group of four volunteers in terms of age, color, socioeconomic status, education, religion, and marital status. However, in the group selected three were unmarried, one married; two were colored, two white; three had only elementary school education, one had graduated from high school. Each selected volunteer was then asked to sign a release form.

Pharmacological Procedures.—Studies were run on Tuesdays. Later, in order to complete the design before one of the subjects left, a Thursday session was added. After breakfast the subjects reported to the Pharmacology Laboratories where, after control readings, they were dosed orally at 8:30 am and kept under observation until released as recovered. Since the LSD-25 effects at the dosage administered did not last more than 4-8 hours, each subject was fully recovered at the time of release. A physician was in constant attendance during the conduct of the study.

Design of Drug Administration.—The first session was without the drug; then followed one with placebo. The drug was then administered sequentially to the four group members in gradually increasing doses from 25μg to 100μg. All placebo sessions were reintroduced in later sessions.

The schedule of drug administration is reproduced below:

The rationale for this scheduling was as follows:

1. By working with one group of four throughout we would be able to obtain measures on the same individuals under different conditions.
2. By administering the drug sequentially to one individual at a time it was possible to obtain a measure of the effects upon one person not confounded by the effects upon the others at various dosages.
3. By later administering the drug to all individuals at once at any particular dosage it was possible to study differences between the effects upon the individual of administration to him alone or to the whole group.
4. The nondrug and placebo sessions at the beginning present an opportunity for the group structure to crystallize before the drug is given.
5. The placebo sessions introduced at later sessions offered a partial control for the effects of possible group process changes over time.

Unfortunately, after the 16th session, one of the white subjects had to be returned to the reformatory, because his reaction to his personal situation at home made the prison authorities fearful. This individual was the least active of the group; his participation in the procedures had been minimal. It was therefore decided to continue with the three members who were left and 24 sessions in all were conducted.

Instructional Set.—During the period of selection each subject was informed of the possible effects of the drug. It was found that two of four subjects retained one week later no memory of the possible effects and the other two recalled at most three effects that might occur.

After the first predrug session the subjects were told only that they were all receiving the experimental drug, and this information was not altered in any way throughout the study.

Social Interaction Studies.—Session 1: On the first Tuesday of the series, the premeasure session, the subjects were not given any drug. They were brought to the social interaction laboratory at 10

TABLE 1.—*Schedule*

	Session and Dosage														
Subject	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	O *	P †	25	P	P	P	P	25	P	P	P	50	P	50	
2	O	P	P	25	P	P	P	25	50	P	P	P	P	50	etc 75 μg
3	O	P	P	P	25	P	P	25	P	50	P	P	P	50	and 100
4	O	P	P	P	P	25	P	25	P	P	50	P	P	50	μg

* O, no drug administration.
P, placebo.

am which was the regular time for the social interaction sessions. In this way the interaction took place at the height of the reaction, 1½-2 hours after the drug was administered.

The Questionnaire: At the first session, the interviewer described briefly what sorts of things sociologists are interested in studying and told the subjects that he would be concerned primarily with their attitudes and feelings regarding certain problems. The subjects were then asked to fill in covertly a questionnaire with twenty questions concerning attitudes towards typical family problems.

The First Discussion—A Family Problem (10 Minutes). The subjects were then instructed how to discuss together one of the problems on which they had disagreed. The interviewer left the room for the ten minutes during which they discussed the problem, but the discussion was recorded.

The Second Discussion—Nontask (5 Minutes). At the end of the ten minutes the interviewer returned to the room and instructed the subjects to relax and talk about whatever they wished for a few minutes until he returned. The tape recorder was left on when he left the room.

The Third Discussion—Group Telling of a TAT Story (10 Minutes). After the five minutes were up the interviewer returned to the room, showed the group a TAT picture and instructed them as to how they should make up a story together about it. He then left the room for ten minutes while they did this and the discussion was recorded.

The Postsession Questionnaire. After the third discussion the interviewer asked each subject to fill in privately a questionnaire in which they were asked to rank each person including themselves in terms of who contributed the best ideas to the discussion and TAT story and who seemed to lead the discussion and the story-telling. They were also asked to list in order their preference for a lunch companion of the other three.

Subsequent Sessions: At each session thereafter the interviewer met the group at 10 am, presented them with another family problem to discuss for ten minutes, gave them a five-minute nontask conversation period, and ten minutes of group story-telling of a different TAT picture. Thus each session provided 25 minutes of recorded discussion.

The postsession questionnaire was filled in each time.

Interviewer's Behaviors: The interviewer's behavior at the first and subsequent sessions were carefully standardized. Written instructions were prepared.

Other Measures: A check list of 40 symptoms was compiled from the literature on LSD-25 and this was filled in by each subject at two hour intervals after the drug (or placebo) was given each day of the study.

Processing of the Data: Twenty-four sessions of 25 minutes of interaction under various drug and placebo conditions were available. These were typed.

An experienced and reliable interaction coder (500 hours of experience) now coded each session from tape plus transcript, without knowledge of the drug condition, with a 20-category version of the Bales Interaction Analysis Code.[4]

This code is as follows:

Revised Scoring Categories

1. Social acknowledgment (common friendly gestures)
2. Showing solidarity through raising status of others (offers of assistance, working together, alleviation of conflict of joking directed toward amusement of group, praise)
3. Shows tension release, laughs
4. Acknowledges, understands, recognizes
5. Showing agreement, concurrence, compliance
6. Gives a procedural suggestion (actions that are directed toward organizations for attending a given goal)
7. Suggest solution (statements attempting to resolve a problem, following a discussion)
8. Gives opinion, evaluation, analysis, expresses feeling or wish
9. Self-analysis and self-questioning behavior (relatively objective self-evaluation)
10. Reference to the external situation as redirected agression (paranoid blame, etc)
11. Gives orientation, information, passes communication
12. Draws attention, repeats, clarifies
13. Asks for orientation, information, clarification
14. Asks for opinion, evaluation, analysis, expression of feeling
15. Asks for suggestion, direction, possible ways of acting
16. Disagrees, maintains a contrary position (disagreement with contents of statement or position of another)
17. Shows tension, asks for help by virtue of personal inadequacy (general characteristics of nervousness including broken phrases and hesitancy in expression, direct indications of social and psychological inadequacy including guilt and shame)
18. Shows tension increase (tenseness that grows out of impasses or bankruptcy of conversation, awkward pauses for group as a whole, also tension in heated discussions)
19. Shows antagonism, hostility, is demanding (actions directed to be either socially or psychologically destructive of the other, aggressive personal attack by ignoring, also hostile humor)
20. Egodefensiveness ("It wasn't my fault")

The following will help to clarify the coding process.

Subject 1. You start off, Joe (1-06)

Subject 2. I answered B for this question (2-11)

Subject 3. What page are we working on? (3-13)

Profiles of the interaction of each group member in each session in terms of number of interacts in each of the twenty categories and number of total interacts were now derived. However, in the analysis which followed, the data for the subject who dropped out after the 16th session were eliminated because of incompleteness.

How Behavioral Change Was Examined.—For three subjects 24 sessions were available. The interaction of each in the 20 interaction categories and a total interaction score had been computed for each session. As we have mentioned earlier, it was desired to derive the baseline behavior of each subject from his full series of 24 interaction sessions. Therefore, for each subject each set of 24 scores for each interaction category and the total score were now ranked (low rank equals low score). Ranks of 12.5 and above were designated "High" while ranks below 12.5 were designated "Low."

The interaction in some categories (1, 7, 9, 13, 18) was not sufficient to justify analysis in these terms and these categories were accordingly dropped.

By summing pluses and minuses for each individual in the various drug conditions the methodological questions and the hypothesis regarding drug effects could now be examined.

Statistical Analysis.—This study was designed to examine in a preliminary fashion the feasibility of using the Bales method to study changes in behavior associated with drugs in a long-term continuing group with the thought that more rigorous studies might follow based upon this experience.

As will appear later, the results of the study indicated clearly that the technique had proven fruitful, for unmistakable differences between the drug and nondrug conditions appeared. However, it was difficult to find a suitable statistic to test for the significance of these differences. Chi-square, though not perfectly appropriate because of the correlations in the data, was finally selected as the most suitable device available. The T-test for correlated proportions which was considered could not be used because paired comparisons were not made.

Results

A. *Methodological Considerations.*—Before presenting the results of the study in terms of our hypothesis about the effects of LSD-25, we will discuss the findings with regard to the two methodological considerations mentioned earlier.

1. The interaction of the subject in terms of the interaction categories in sessions where he alone received the drug would differ from that in sessions where all received the drug.

For each of the three subjects four situations were available in which he alone received the drug and four in which the whole group received the drug.

The frequency of high and low ranks for the three subjects together was now obtained for the situations in which the subject alone received the drug (12) and for the situation in which all received the drug (12). For each of the interaction categories (except 1, 7, 9, 13 and 18) and for total interaction the differences in the frequencies of high and low ranks were now examined by χ^2. The results of this analysis appear in Table 2.

One χ^2 only is significant and this is close to what one would anticipate by chance in this number of analyses. It does not appear that the effects on behavior associated with the drug are different in the case where the individual alone gets the drug or where all get it together. However, in eight cases the alone condition is higher while in four cases it is lower and in three cases the same suggesting there is some advantage to the alone condition in terms of more dramatic delineation of drug effects.

2. The interaction of the subjects in sessions where no group member received the drug would differ from that in sessions where another group member received the drug (secondary effects of the drug).

For each subject one nondrug and four placebo sessions were available in which no drug was administered and 11 sessions in which another subject received the drug while they had placebo.

The frequencies of high and low ranks for the three subjects in these two situations was now derived and the differences examined by χ^2.

The results of this analysis appear in Table 3.

One significant difference only appears and this is close to what would be expected by chance in this number of analyses. Therefore it does not seem that the drug has pro-

TABLE 2.—*Frequencies of High (12.5 and Above) and Low (Below 12.5) Ranks for the Three Subjects in Sessions Where They Alone Received the Drug and in Sessions Where All Received the Drug*

	Alone (12 Sessions)		Together (12 Sessions)		Significant
	High	Low	High	Low	χ^2
Total interaction, 21	11	1	11	1	ns
Tension, 17	9	3	7	5	ns
Tension release, 3	10	2	7	5	ns
Neg. Social-Emotional					
Projected hostility, 10	9	3	5	7	ns
Disagreement, 16	9	3	10	2	ns
Overt hostility, 19	8	4	11	1	ns
Egodefensiveness, 20	9	3	4	8	4.2 *
Pos. Social-Emotional					
Social facilitative, 2	8	4	5	7	ns
Acknowledgment, 4	7	5	7	5	ns
Agreement, 5	6	6	6	6	ns
Task					
Procedural suggestion, 6	8	4	4	8	ns
Gives opinion, 8	8	4	8	4	ns
Gives information, 11	10	2	9	3	ns
Explains, clarifies, 12	10	2	11	1	ns
Asks for opinion, 14	5	7	8	4	ns
Asks for suggestion, 15	7	5	4	8	ns

* Significant above the 0.05 level.

duced significant secondary effects upon the behaviors of the group members.

We have now found that significant differences do not appear where one subject alone receives the drug and where all receive the drug so that these types of sessions may be combined in the analysis of drug effects which follows. Also, nondrug behaviors do

TABLE 3.—*Frequencies of High (12.5 and above) and Low (under 12.5) Ranks for the Three Subjects in Sessions in Which No Subjects Received the Drug and Sessions in Which Another Subject Received the Drug*

	All, No Drug		Some, No Drug		Significant
	High	Low	High	Low	χ^2
Total interaction, 21	5	10	9	24	ns
Tension, 17	7	8	14	19	ns
Tension release, 3	7	8	13	20	ns
Neg. Social-Emotional					
Projected hostility, 10	5	10	14	19	ns
Disagreement, 16	4	11	13	20	ns
Overt hostility, 19	4	11	14	19	ns
Egodefensiveness, 20	5	10	12	21	ns
Pos. Social-Emotional					
Social facilitative, 2	8	7	15	18	ns
Acknowledgment, 4	9	6	14	19	ns
Agreement, 5	7	8	15	18	ns
Task					
Procedural suggestion, 6	10	5	12	21	3.8 *
Gives opinion, 8	6	9	14	19	ns
Gives information, 11	5	10	14	19	ns
Explains, clarifies, 12	4	11	11	22	ns
Asks for opinion, 14	7	8	20	13	ns
Asks for suggestion, 15	11	4	15	18	ns

* Significant at the 5% level.

TABLE 4.—*Frequencies of High (12.5 and Above) and Low (Under 12.5) Ranks for the Three Subjects in Drug and Nondrug Sessions for Each Interaction Category and for Total Interaction*

	With Drug (24 Sessions)		Without Drug (48 Sessions)		Significant
	High	Low	High	Low	χ^2
Total interaction, 21	22	2	14	34	25.2 †
Tension, 17	16	8	21	27	(3.4)
Tension release, 3	17	7	20	28	5.8 *
Neg. Social-Emotional					
Projected hostility, 10	14	10	19	29	ns
Disagreement, 16	19	5	17	31	12.2 †
Overt hostility, 19	19	5	18	30	11.1 †
Egodefensiveness, 20	13	11	17	31	ns
Pos. Social-Emotional					
Social facilitative, 2	13	11	23	25	ns
Acknowledgment, 4	14	10	23	25	ns
Agreement, 5	12	12	22	26	ns
Task					
Procedural suggestion, 6	12	12	22	26	ns
Gives opinion, 8	16	8	20	28	4.0 *
Gives information, 11	19	5	19	29	10.1 †
Explains, clarifies, 12	21	3	15	33	20.4 †
Asks for opinion, 14	13	11	27	21	ns
Asks for suggestion, 15	11	13	26	22	ns

* Significant above the 5% level.
† Significant above the 1% level.

not differ in sessions where one subject receives the drug and sessions where no person receives the drug, that is to say the secondary effects of the drug upon interaction are not significant. Therefore, these two types of nondrug conditions can also be combined. With these considerations in mind we now turn to our hypothesis regarding the effects of LSD-25 upon group behaviors.

The interaction of the subjects in terms of the 20 interaction categories would differ when they had been administered LSD-25 from their interaction when they had not been administered the drug.

For each subject eight sessions were available in which he received the drug and 16 sessions in which he did not. For the three subjects combined there were thus 24 drug sessions and 48 nondrug sessions. In Table 4 are shown the frequencies of high and low ranks in these conditions.

The interaction of the subjects differs greatly in the drug and nondrug sessions. The drug appears to act as a powerful stimulant to verbal activity; total interaction rates are markedly elevated. Tension is higher with the drug, though not significantly, while tension release in laughter rises. Positive social-emotional behaviors show no differences, though negative social-emotional behaviors are high with the drug, particularly overt hostility and disagreement. With regard to the task behaviors, more opinions and information are given and more explanations are offered, though more dominance in terms of procedural suggestions does not appear with the drug.

The Symptom Check-List.—Each subject had been asked to fill in at two-hour intervals throughout the day following the administration of the drug (or placebo), a checklist of 40 items representing characteristic symptoms which might be associated with the administration of LSD-25 (physiological, perceptual, conceptual, and social-emotional). The relation of the report of symptoms to the changes in interaction will be reported more fully at a later date. Here it is sufficient to note that, for instance, in the case of subject C no symptoms were reported under 25μg, while seven were reported at 50μg, whereas an examination of

his interaction in the group sessions at both 25μg and 50μg showed marked behavioral alterations. Subject B who reported 21 symptoms at 25μg and 89 at 50μg showed behavioral changes also but they were very similar to those of subject C despite the great difference in subjective reports.

These findings suggested that the interaction method of examination of changes associated with drug administration might have certain advantages over subjective report in some cases in terms of sensitivity.

Comment

Our major purpose in this study has been to explore the feasibility of using the Bales Interaction Technique to measure changes in behavior in a four-person continuing discussion group in relation to varying doses of the hallucinogenic drug LSD-25.

The results of the study would indicate that this use of the technique has been quite successful, for highly significant differences in interaction have emerged in relation to the administration of the drug. Moreover, these differences have confirmed findings regarding LSD-25 reported in the literature by investigators working with different techniques.[7,8,13,16]

Thus, the drug appears to have acted as a powerful stimulant. Total interaction rates are markedly elevated. Signs of tension, tension release, overt hostility, and disagreement have risen.

It is of interest that our findings in this study contradict those of Lennard and his associates who reported in 1961 the first study of the effects of LSD-25 upon behavior in which the Bales technique was used.[10] These investigators recorded a session in which four group members were given various doses of LSD-25. They compared the interactions of the group members to their interactions in another session five months later in which the four group members had placebo They also used as baseline the interactions of Lennard's group members in reconstituted groups in which others were administered LSD-25. It was found that under the drug total activity and hostility rates decreased. However, one might question whether one placebo session five months later and interaction of subjects in reconstituted groups would offer a legitimate baseline from which to measure changes with the drug.

In this initial exploratory study we employed deliberately a rather long, drawn-out and intricate design for the purpose of examining certain methodological considerations relevant to this type of study. Thus, we found that it did not make a difference with regard to drug effects upon the individual whether he alone got the drug or whether all four got the drug, though there was some indication that the effects were more clearly delineated where one subject alone had the drug. In the tracing of the effects of milder drugs by the Bales method this finding might be of importance. Also, the effects upon the others of one group member getting the drug were not significant, that is to say, secondary effects of the drug upon the interaction of the other members did not appear significantly.

We have also observed that while the subjective reports of our subjects regarding LSD-25 effects might show little with the drug, marked changes in behavior were picked up by the interaction technique.

These findings suggest that the technique is worth further exploration, that it may provide more sensitivity than subjective report in some cases, and that it shows potential for a clear and objective delineation of drug effects upon interpersonal behavior.

Summary

A four-person continuing discussion group of reformatory inmates was administered varying doses of LSD-25 over a period of several weeks. At times one group member only received the drug, at times all four. Placebo sessions were interspersed throughout the series. The discussions were recorded, transcribed, and coded with a 20-category version of the Bales Interaction Categories.

Highly significant behavioral changes were associated with the drug and these changes

Arch.gen.Psychiat. 9, 574 (1963)

confirmed literature reports of its effects. Thus, total interaction rates, signs of tension, tension release, overt hostility, and disagreement rose markedly. In some cases, marked behavioral changes were picked up by the interaction technique, while the subjective reports of the subjects regarding LSD-25 effects showed little.

These findings suggest that the Bales technique as a measure of changes in interpersonal behavior in relation to drug administration would be worth further exploration.

This study was made possible by the kind cooperation of the Bordentown Reformatory in allowing its inmates to act as volunteer subjects. I am also grateful to Dr. Carl Pfeiffer who administered the drug and provided medical supervision, to Dr. Bernard Aaronson who conducted the psychological examinations, and to Dr. Moke Williams who carried out the physical and psychiatric evaluations.

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