

## Effects of Control and Predictability on the Physical and Psychological Well-Being of the Institutionalized Aged

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It was hypothesized that some of the characteristics frequently observed among the aged—such as feelings of depression and helplessness, as well as accelerated physical decline—are at least in part attributable to loss of control. A field experiment in which institutionalized aged were randomly assigned to one of four conditions was carried out to assess the effects of increased control and predictability upon the physical and psychological well-being of the aged. Individuals in three of the four conditions were visited by college undergraduates under varying contingencies, while persons in the fourth condition were not visited and served as a baseline comparison group. Subjects in the control condition could determine both the frequency and duration of visits they received. A second group of subjects (predict) was informed when they would be visited and how long the visitor would stay, but had no control over these details. A third group (random) was visited on a random schedule. It was found that predictable and controllable positive events have a powerful positive impact upon the well-being of the institutionalized aged.

From the very young to the very old and dying, persons strive to control their environments. More than a decade ago, White (1959) concluded that many of an infant's diverse behaviors are motivated by a biological drive which prompts the organism to find out how to deal effectively with its environment. More recently, the importance of contingency between behavior and outcome for the normal development of organisms has been demonstrated in both humans (Seligman, 1975; Skeels, 1966; Spitz, 1962; Watson, Note 1) and animals (Harlow, 1968; Joffe, Rawson, & Mulick, cited in Seligman, 1975). Learning deficits as well as the ability to carry on normal social interactions with other organisms are typical results of prolonged experiences of noncontingency.

Although less is known about human development beyond childhood and adolescence,

one characteristic of adult development is that most individuals continue to expand their realm of competencies. For example, increased social and financial status enable most individuals continually to enlarge control over the environment as they grow older.

Typically, however, retirement and old age precipitate an abrupt decline in control. Retirement means the loss of one of the most meaningful sources of instrumental control in life, the work role. Closely related is the loss of income, often resulting in further shrinkage of an individual's control as it becomes necessary to curtail activities requiring money. In addition, many individuals at this age experience some deterioration in physical condition, representing a further shrinkage of their sphere of control. Finally, aged individuals suffer the loss of the child-rearing role, which was undoubtedly an important source of competence and environmental control in their younger and middle years.

In addition to the role losses associated with retirement, many aged individuals experience further declines in their ability to manipulate and control the environment as a result of institutionalization. Schulz and Aderman (1973) have noted that a patient's adverse reactions to institutionalization are probably mediated by feelings of helplessness,

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born out of the patient's perception that the institutional demands for passivity represent a real loss in his ability to control the environment. The consequences of such a loss of control usually include withdrawal, depression (Schulz & Aderman, 1974; Streib, 1971), and sometimes early death (Schulz & Aderman, 1973). Experimental studies with animals (for a review, see Seligman, Maier, & Solomon, 1971) and humans (Roth & Kubal, 1975) amply demonstrate the negative effects of loss of control. Seligman (1974) attributes motivational, cognitive, and emotional deficits to any prolonged experience with lack of contingency between individuals' behavior and their outcomes. Roth and Kubal (1975) demonstrated that subjects working on an important task who received large amounts of exposure to a noncontingency situation behaved helplessly in a subsequent task situation.

#### *Control and Predictability*

Personal control is generally defined as the ability to manipulate some aspect of the environment. In his recent review of the control literature, Averill (1973) distinguishes three types of control—behavioral, cognitive, and decisional—and points out that each type can be beneficial in alleviating the negative effects of a stressor. It is not clear, however, whether the beneficial effects are attributable to control or increased predictability. For example, stimulus regulation, a type of behavioral control where the subject determines either when an aversive stimulus is delivered or who delivers it, is found to be stress reducing only when accompanied by the reduction of uncertainty regarding the threatening event (Averill, 1973). Similarly, the reduction in experienced stress resulting from signaled as opposed to unsignaled shock is readily attributable to the greater predictability of the former.

Thus, control is confounded by predictability in that having control over a stimulus also means that it is predictable. It becomes important to ask, therefore, whether the ability to control adds something over and above the ability to predict.

Experiments designed to answer this question were carried out by Reim, Glass, and

Singer (1971) and Geer and Maisel (1972). In the Reim et al. (1971) study, subjects given perceived control over the termination of aversive noise exhibited significantly less autonomic reactivity (vasoconstriction) when compared to subjects in predictable and unpredictable noise conditions. In addition, subjects in the perceived control and predictable noise conditions exhibited significantly better performance than subjects in the unpredictable noise condition on a proofreading task given after the noise experience. There were, however, no differences between the predict and perceived control groups on the proofreading task. In the experiment by Geer and Maisel (1972), one group (control) of subjects could control the termination of aversive photographs of dead bodies, while subjects in the predict group knew when and how long the photographs would be presented but had no control over when the photographs would be terminated. Subjects in the no-control-no-predictability group could neither control nor predict the occurrence of the photographs. The results revealed that subjects with control over the termination of the aversive stimulus exhibited lower galvanic skin response reactivity to the stimulus than those subjects with prediction alone. Results from both of the above studies indicate that control is more than just predictability, although the advantages of control appear to be limited to physiological measures taken in the presence of the stressor. In view of the limited research on this issue and the existence of alternative explanations for the reported findings (see Geer & Maisel, 1972; Seligman, 1975), further research is warranted.

The existing literature on control focuses almost exclusively on the effects of having control over aversive events. Only a few investigators have used positive stimuli such as food or money in the context of a control experiment.

In addition to several studies already cited (Skeels, 1966; Spitz, 1962; Watson, Note 1) demonstrating the importance of acquiring control over positive reinforcers for adequate infant development, several additional studies illustrate the importance of control over positive events in mature organisms. In an experiment carried out by Engberg, Hanse, Walker,

and Thomas (cited in Seligman, 1975), hungry pigeons who in the past had been contingently reinforced with food were better at subsequent learning tasks than pigeons who had been reinforced noncontingently. Other animal studies have demonstrated that organisms prefer working for positive reinforcers over securing them for free. Carder and Berkowitz (1970), Jensen (1963), and Neuringer (1969) have all reported that rats prefer response-contingent food over response-independent food, suggesting that response-contingent stimulation is probably more positive than the same stimulation when it is response independent.

Using human subjects, Lanzetta and Driscoll (1966) examined the preference for information about a potential outcome as a function of whether it was negative (shock) or positive (monetary reward). Lanzetta and Driscoll found that subjects preferred to have information as opposed to no information about an anticipated event, regardless of potential outcomes. This suggests that information which might be useful in achieving cognitive control is just as desirable when the outcome is positive as when it is negative. With this exception, little is in fact known about how humans react to controlled versus random positive events.

### *The Present Study*

The present study was designed to assess the effects of increased control over and predictability of a positive outcome upon the psychological and physiological well-being of the aged. The intent of this research was twofold. First, viewed from the perspective of the theoretical literature on control, this study was designed to answer some important questions on the effect of having control over positive outcomes. In addition, the study was designed to assess the relative importance of control and predictability in relation to positive events. Second, since this was an experimental field as opposed to correlational study, it was expected that cause and effect statements could be made about the importance of these variables to successful aging.

In order to give some of the aged subjects the opportunity to exert control over a posi-

tive event in their environment, it was decided to make a student visitor available to them for a 2-month period. Since institutionalized aged persons are often very lonely (Streib, 1971), being visited by a friendly college student was conceptualized as a significant positive event. Control subjects could exert control over the frequency and duration of visits they received, giving them the opportunity both to regulate and to modify the positive event.

To assess the effects of predictability, a second group of subjects was informed at what time and how long they would be visited but was not given any control over these details. A third group of subjects was visited on a random schedule. They were not given any control over the duration or frequency of visits. This group served as one of two "control" conditions. Finally, a fourth group of subjects served as a baseline comparison group. These individuals were not visited except to collect data. Individuals in predict and random groups were yoked to the control group in order to keep the frequency and duration of visits constant across all three conditions.

Data relevant to level of activity and the physical and psychological status of each subject were collected before and after being visited for a 2-month period. On the basis of existing literature on control, it was predicted that having control and predictability would result in significantly greater positive effects on the physical and psychological status indicators than random visits or no treatment. This prediction was based on the notion that making a significant positive event either predictable or controllable would halt or reverse the process of continued loss of control and therefore have a positive impact on the physical and psychological status of the aged, as well as positively affect their evaluation of the visits. Given that these aged individuals were very lonely to begin with, it was further hypothesized that being visited even on a random basis would be beneficial to the subjects. Finally, since the focus of this research was on the generalized effects of control and predictability, no specific predictions about the advantages of control over predictability were made. On the basis of previous studies

with aversive events (Reim et al., 1971), one would not expect to find such differences.

## METHOD

### *Subjects and Setting*

Thirty-six retired women and 6 retired men living in a private, church-affiliated retirement home in North Carolina served as subjects for this study. Subjects ranged in age from 67 to 96 years old with a mean age of 81.5. The ability to walk and talk were the two criteria for being included in the study.

Subjects were asked at either a group meeting in the retirement home or individually to participate in a dissertation project which involved charting the "daily activities of aged individuals." Only 1 person refused to participate when asked individually. Subjects were randomly assigned to one of four conditions. Two subjects initially included in the study had to be replaced in order to have 10 subjects per condition. One subject left the home to go on a long vacation and the other became incommunicable because of emotional problems. The latter subject was in the random visitor group, while the former was in the control visitor group.

A resident's regular contact with others in the home was usually limited to two or three close friends living in close proximity. To avoid arousing suspicion and the contamination of the manipulations, an effort was made to exclude individuals from the study who might be in close contact with each other and compare notes about what was happening.

### *Procedure*

After obtaining permission to carry out this study from the directors of the retirement home, the experimenter was invited to attend a "town house" meeting to present his research plan to the residents of the home. Approximately 40 people attended the meeting and 16 of those present expressed some interest in participating in an investigation described to them as an effort to "chart the daily activities of aged individuals." These 16 individuals as well as 27 others were later personally approached by the experimenter. The 27 subjects were chosen on the basis of location within the home such that communication among them would be minimized. In each case, the experimenter, wearing a sports coat and tie, introduced himself as a graduate student interested in studying senior citizens. After approximately 30 minutes of casual conversation, the initial interview began.

### *Initial Interview*

If the subject was still able to read and write, the experimenter left a folder containing three questionnaires with the subject. Before leaving, the experimenter explained each questionnaire in detail. For those individuals too blind to read or too shaky to write, the experimenter administered the questionnaires verbally. A fourth questionnaire, the Wohlford Hope Scale (1966), and some health status

questions were administered verbally to all subjects at the initial meeting.

The four questionnaires administered at the interview were entitled "Activities," "My Usual Day," "Future Diary," and the "Wohlford Hope Scale." Answers to six open-ended items on the Activities questionnaire were used to calculate an Activity Index. The index was calculated by adding together the frequency per week of those pursuits requiring active participation. These included number of visits to neighbors in the building, number of visits outside the building, number of times the building was left for activities other than visiting, number of club meetings attended, number of visits to church, and number of phone calls made.

The remaining three printed questionnaires were taken from Schonfield (1973) and have been demonstrated to be useful indicators of successful aging. Briefly, data from the "Usual Day" questionnaire was used to calculate the percentage of waking time the subject spent in active pursuits in a day. The "Future Diary" questionnaire was used to assess the percentage of time devoted to special commitments during the waking hours of the next 7 days (see Schonfield, 1973, for a detailed description of these measurement devices).

In administering the "Wohlford Hope Scale," the experimenter simply asked the subjects to "name 10 things that you have talked about or thought about in the last week or two." After the subject completed this task, the experimenter continued:

I am going to read back to you each of the things you have mentioned. I want you to describe each by giving it certain ratings: past, present, or future. Decide whether at the time you thought about it, the idea or topic referred to something mostly in the past, present, or future. Finally, I want you to give me the actual date or approximate date when the thing occurred or probably will occur. If it occurs over a period of time, give your best estimate of the range of dates.

The following tabulation scale was used to weigh each item either negatively if it occurred in the past or positively if it occurred in the future:

- 0 = under 2 hours,
- 1 = 2 hours to 1 week,
- 2 = 1 week to under 1 month,
- 3 = 1 month to under 4 months,
- 4 = 4 months to 1 year,
- 5 = 1 year to 4 years,
- 6 = 4 years or over.

A mean score ranging from -6 to +6 was obtained for each subject where the higher the number (the more future-oriented), the greater the level of hope.

In order to assess health status, subjects were asked whether they had any disabilities (e.g., diabetes, arthritis, blindness, etc.), how often they visited the infirmary per week, and how many different types of medication they took each day as well as the quantity of each.

The order in which the questionnaires were administered was the same for all subjects. The Wohlford Hope Scale was first, followed by the Activity, Usual Day, and the Future Diary questionnaires, in that order. The health status questions were last. As soon as all of the initial information was collected, subjects were randomly assigned to one of four experimental conditions and the manipulation phase of the experiment began.

### *Manipulation Phase*

Five undergraduate students (four females and one male) visited the residents at the home. Each visitor was assigned subjects in sets of three, one in each visitation condition, and trained to carry out the manipulations accurately.

Regardless of condition, all visitors made their initial contact with subjects by introducing themselves as Duke undergraduates and as friends of the experimenter. They stated that they were interested in having some firsthand interaction experience with elderly individuals. They added that they were taking a course on aging at Duke and thought it would be a good experience "to get out into the real world and talk to some elderly people." They also remarked that the experimenter had suggested that they "might enjoy having someone to talk to." After delivering these opening statements, the visitors allowed the subject to control the content of the discussions that ensued. The tension typically aroused when two strangers meet usually dissipated very quickly. The three experimental manipulations described below were introduced at the end of the first visit.

*Control visitor group.* Individuals assigned to this condition had the opportunity to control both the duration (modify) and frequency (regulate) of visits they received. After approximately 45 minutes of the initial meeting had elapsed, the visitor informed the subject that "I don't want to take any more of your time today than you can afford to spare. So if you would like to stop at any time, please tell me." The subject usually responded by saying that it would be all right to spend a few more minutes together. On subsequent visits, the visitor reminded the subject at the beginning of the visit not "to let me stay any longer than you want me to." Shortly before leaving, the visitor said, "I really enjoyed talking to you. My schedule is very open right now. I can come back any time you would like me to. Do you know when would be a good time for me to come back for another visit?" After waiting for a response, the visitor added, "Let me write down my name and phone number for you. If you ever just feel like talking, give me a call and I'll be over." Arrangements for the second meeting were usually made at the first meeting. For subsequent meetings, however, subjects began making arrangements by telephone as well.

*Predict visitor group.* Individuals assigned to this condition were informed when to expect a visitor but were not given the opportunity to determine when a visitor came or how long he stayed. When arranging

the visit with the subject, the visitor first asked, "How are you doing?" and then stated, "I'll be at the home \_\_\_\_\_. I'll drop by to see you at \_\_\_\_\_ o'clock." Each subject in this group was yoked to a specific individual in the control visitor group such that the amount of visitation was the same in this condition as in the control visitor condition. Since control visitor subjects were always seen first, the visitor knew when to terminate each visit with the yoked *predict visitor subject*. To make the duration of the visit as predictable as possible, subjects were informed at the beginning of each meeting approximately how long the visit would last. In addition, as soon as the visitor knew when the next visit with the control visitor subject would occur, the yoked *predict visitor subject* was informed of the time of the next visit either by telephone or in person. In order to hold the visitor's expressed liking for the subject constant across all conditions, each meeting was terminated with the visitor saying, "I really enjoyed talking with you."

*Random visitor group.* Subjects in this group were also yoked to individuals in the control visitor group such that they were visited just as frequently and for the same length of time as individuals in the control visitor group. They were not, however, given the opportunity to control either when a visitor came or how long he stayed. Nor were they notified when a visitor was coming. Upon arriving at the subject's room, the visitor first asked, "How are you doing?" and then stated, "I decided to drop by and pay you a visit today." Since it was likely that expectancies would be created if the visitor came the same time every week, visits were scattered such that they never occurred on the same day of the week for any 2 consecutive weeks. As was the case with the other visitation conditions, all meetings were terminated with the visitor saying, "I really enjoyed talking to you."

Visitors were instructed to keep their behavior as constant as possible across all conditions. This was accomplished by having the visitor play a relatively passive role when interacting with the subject. Each visitor was asked to keep a diary in which were recorded the number of visits made per week, the length of each visit, and, on a 9-point Likert-type scale, how much they enjoyed each visit. The latter scale was used to assess the quality of interactions from the visitor's point of view.

### *Postinterview*

To assess the effects of the manipulations, the three visitation groups and the no-visit comparison group were interviewed by two experimenters approximately 2 months after the initial interview. Experimenter 1, the same individual who carried out the initial interview, administered the same battery of questionnaires used in the first interview. With the exception of the Wohlford Hope Scale, all responses were scored the same way for this set of questionnaires as they were for the first set. In scoring the Wohlford Hope Scale, all references to the visitor were excluded in order to make com-

parisons between the visitation groups and the no-visit comparison group valid. Difference scores representing pre- to postmanipulation changes were calculated for all measures. Experimenter 1 was blind as to which condition each subject was in.

Experimenter 1 also administered two additional 9-point Likert-type scales to the activities director at the home. The activities director was asked to rate each subject on two scales entitled "Health Status" (the two extremes were labeled "in perfect health" and "extremely ill") and "Zest for Life" (the two extremes were "extremely enthusiastic about life" and "completely hopeless"). The activities director had worked at the home for many years as a nurse before taking on this new position and was as a result personally acquainted with all of the participants in the study. However, she knew nothing about the study and was therefore blind as to which condition each subject was in.

Experimenter 2 introduced himself to the subject as a friend of Experimenter 1 who was "helping him collect some information." Experimenter 2 verbally administered three questionnaires entitled "Background Data," "Visitation Questions," and "Tri-Scales."

The Background Data questionnaire consisted of seven questions. Subjects were asked how long they had lived at the home, under what circumstances they had come to the home, how much they liked the home, what percentage of the time they were lonely, percentage of time bored, whether they had lost any close friends or relatives recently, and what kinds of physical problems they had.

The Visitation Questions survey contained 10 items pertaining to the visitor. Several of the items were manipulation checks, while others served as dependent measures. Among the manipulation checks were the following questions: How often were you visited? Did your visitor come the same time every week? Did he/she let you know when he/she was coming? Who decided when the visitor should come? Who determined how long the visitor stayed? How dependable a person do you think the visitor is? Questions pertaining to how well the visitor was liked and how much the visits were enjoyed by the subject served as dependent measures. On a 9-point Likert-type scale ranging from the two extremes "do not like at all" to "like very much," subjects indicated how much they liked the visitor. On an identical scale, subjects were asked to indicate how much they liked the visitor "compared to the person you like most in the world." Subjects also used 9-point scales to indicate how much they enjoyed the visits and how much they enjoyed the visits "compared to what you enjoy doing most."

The final questionnaire, "Tri-Scales," consisted of 10 9-point Likert-type scales tapping such dimensions as happiness, health status, usefulness, etc. In order to give subjects a reference point, the midpoint of the scale was always labeled "Average American." Given this midpoint, subjects were first asked to rate themselves on each of the 10 dimensions as they perceived themselves at present by

placing an "X" on the scale. A second rating was obtained to indicate a subject's "best year" on each dimension. This was done by placing a "B" on the scale. Finally, a subject made a third rating by placing an "O" on the scale where they perceived other old people to fall on each dimension. A composite score similar to one used by Schonfield (1973) for each dimension was derived using the formula  $3X - B - O$ .<sup>1</sup> Experimenter 2 administered all questionnaires verbally and, although he knew whether a subject was visited, he was unaware of the contingencies under which these visits occurred.

## RESULTS

### *Manipulation Checks*

Subjects assigned to the visitation groups were visited an average of 1.3 times per week with the mean length of each visit being 50.8, 49.0, and 50.0 minutes for the random, predict, and control groups, respectively. Thus, there were no differences in the frequency or duration of visits among the three visitation groups.

To check on the effectiveness of the control manipulation, all subjects in the visitation groups were asked, "Who decided when the visitor should come?" Nine of 10 control subjects responded that they determined when he came. Two of 8 predict subjects felt they determined the delivery of the positive event, while only 1 of 10 random subjects felt this way. Fisher's exact test showed the differences between the control and the other two visitation groups to be significant (control versus predict,  $p < .005$ ; control versus random,  $p < .005$ ). Answers to the question of who

<sup>1</sup> The rationale behind this formula was as follows: Assessing an individual's status on each dimension should first be based on where he perceives himself at present (the "X" score). The disparity between "best year" and present state ( $B - X$ ) was subtracted from present state since this represents self-assessed deterioration. When there has been no deterioration ( $B - X = 0$ ) the X score is not decreased indicating that the individual is aging successfully (Schonfield, 1973). Self-assessed present superiority over other old people should add to feelings of well-being, while feelings of inferiority should reduce such feelings. Thus, the difference could either be positive or negative. The formula finally arrived at was  $X - (B - X) + (X - O) = 3X - B - O$ . In order to ensure a minimum score of 1, the constant 16 was added. The possible range of scores was 1 (when  $X = 1, B = 9, O = 9$ ) to 40 (when  $X = 9, B = 1, O = 1$ ).

determined how long the visitor stayed, revealed a similar pattern of results. Eight of 10 control subjects felt that they determined the length of visits, while only 2 of 10 predict and 3 of 10 random subjects felt this way. Comparisons between the control group and the other two groups were again significant. The probability level for both comparisons using Fisher's exact test was less than .025.

The effectiveness of the predictability manipulation was assessed by the question, "Did the visitor let you know when he was coming?" As expected, control and predict subjects felt they had been informed, while random subjects reported not being informed. Nine of 10 control and 9 of 10 predict subjects reported being informed. None of the random subjects felt this way. Fisher's exact test again revealed highly significant results when comparing control with random ( $p < .005$ ) and predict with random subjects ( $p < .005$ ). It was also expected that the visitor would be perceived as being more dependable by the control and predict groups. The mean dependability ratings for the three groups were 6.6 (random), 7.3 (predict), and 8.1 (control), with high scores reflecting higher levels of perceived dependability. The difference between random and predict groups was not significant, while a comparison between predict and control conditions revealed a significant effect,  $F(1, 36) = 4.20, p < .05$ .

It can be safely concluded from these results that the manipulations had their intended effects. As expected, control subjects felt they controlled both the frequency and duration of visits. Predict subjects reported knowing when visitors would come, and random subjects perceived neither forewarning nor control over the delivery of the reinforcer.

### Major Analysis

A total of 15 dependent variables were analyzed such that the effects of the manipulations on health status, psychological status, and activity level could be assessed. The general plan of the analysis was as follows. Initially, three orthogonal comparisons were carried out for all variables. They were as follows: (a) no treatment versus random, to determine the effects of a positive reinforcer per se; (b) predict versus control, to test the

effects of control over and above predictability; and finally (c) no treatment plus random versus predict plus control, to determine the effects of experimental treatment relative to the two "control" conditions. A multivariate analysis of variance for each comparison yielded a significant multivariate  $F$  only for the comparison of no treatment plus random with predict plus control, multivariate  $F(15, 22) = 2.50, p < .025$ .

To assess the effectiveness of the random assignment procedure, multivariate analyses of variance were carried out on all of the premeasures including age of subject and length of time at the home. No significant multivariate  $F$ s were found, although there was a marginally significant difference when univariate  $F$ s for age were examined, predict versus control  $F(1, 36) = 2.902, p < .097$ ; random versus no visits  $F(1, 36) = 3.247, p < .080$ . Subjects in the random visits group tended to be older than subjects in the no-visits group (83.4 and 77.9, respectively) and subjects in the control group tended to be older than subjects in the predict group (85.0 and 79.8, respectively). It can be safely concluded from this analysis that the random assignment procedure was effective.

### Health Status Indicators

Five different indicators of health status were used to assess the effects of the experimental manipulations. The comparison of no treatment plus random against predict plus control yielded several significant results. The predict plus control groups were rated as significantly healthier by the activities director at the home than a combination of the no-treatment and random groups,  $F(1, 36) = 4.457, p < .042$ . Analysis of change scores on quantity of medication taken per day revealed a significant effect for the same contrast,  $F(1, 36) = 5.953, p < .02$ . Table 1 shows that mean increases in quantity of medication were smaller for the predict plus control groups than the no-treatment plus random groups. A marginally significant difference for the same contrast was found when analyzing the change scores for number of different types of medication taken per day,  $F(1, 36) = 3.041, p < .09$ . The means in Table 1 show that, although all groups in-

TABLE 1  
MEAN HEALTH STATUS INDICATORS BY CONDITION

Variable	Condition			
	No treatment	Random	Predict	Control
Health status as assessed by activities				
director at home <sup>a</sup>	5.10	4.70	6.10	6.90
Triscale composite on health <sup>a</sup>	19.80	20.30	21.20	20.80
Change in number of types of medication used per day <sup>b</sup>	+ .70	+ .80	+ .40	+ .40
Change in quantity of medication taken per day <sup>b</sup>	+2.40	+2.40	+ .90	+ .80
Change in number of trips to the infirmary per week <sup>b</sup>	+ .70	+ .85	+ .30	+ .85

<sup>a</sup> The higher the score, the better the perceived health of the individual.

<sup>b</sup> Positive numbers represent increases.

crease their intake of the number of different types of medication, the increase is smaller for the predict and control groups.

#### *Psychological Status Indicators*

Six dependent measures were analyzed to determine the effects of the manipulations on psychological status. Again only the comparison of predict plus control with no treatment plus random yielded statistically significant results for these variables. Relative to the no-treatment plus random groups, the predict plus control groups perceived themselves as significantly happier,  $F(1, 36) = 7.134$ ,  $p < .011$ , and were judged to have significantly more "zest for life,"  $F(1, 36) = 8.072$ ,  $p < .007$ . Table 2 reveals that both no-treatment and random groups evidenced a decline in level of hope, while the predict and control groups showed an increase,  $F(1, 36) = 5.467$ ,  $p < .025$ . Marginally significant differences for the same comparison were found for the variables, percentage of time lonely,  $F(1, 36)$

$= 3.682$ ,  $p < .063$ , percentage of time bored,  $F(1, 36) = 3.046$ ,  $p < .089$ , and usefulness,  $F(1, 36) = 4.008$ ,  $p < .053$ . The means in Table 2 reveal that, for all dependent variables, the predict and control groups were superior in psychological status when compared to the no-treatment and random groups.

#### *Activity Level Indicators*

All four indicators of activity level revealed significant differences when comparing predict plus control against no treatment plus random. Predict plus control group subjects evidenced more positive change in the time devoted to active pursuits in a "Usual Day,"  $F(1, 36) = 4.744$ ,  $p < .036$ , in the time devoted to "Future Commitments,"  $F(1, 36) = 11.71$ ,  $p < .002$ , and on the "Activity Index,"  $F(1, 36) = 10.736$ ,  $p < .002$ , than the no-treatment plus random groups. In addition, predict plus control subjects perceived themselves as significantly more active,  $F(1, 36)$

TABLE 2  
MEAN PSYCHOLOGICAL STATUS INDICATORS BY CONDITION

Variable	Condition			
	No treatment	Random	Predict	Control
"Zest for Life" as rated by activities				
director at home <sup>a</sup>	4.30	5.00	6.10	7.00
Change in level of hope <sup>b</sup>	-.31	-.07	+ .20	+ .42
Percentage of time lonely	8.00	11.00	3.00	1.00
Percentage of time bored	7.00	15.50	4.00	4.00
Triscale composite on happiness <sup>c</sup>	19.50	20.90	22.70	23.30
Triscale composite on usefulness <sup>d</sup>	17.40	17.50	18.90	21.60

<sup>a</sup> The higher the score, the greater the individual's perceived zest for life.

<sup>b</sup> Positive numbers represent increases, negative numbers decreases.

<sup>c</sup> The higher the score, the more happy the individual perceives himself to be.

<sup>d</sup> The higher the score, the more useful the individual perceives himself to be.

TABLE 3  
MEAN ACTIVITY LEVEL INDICATORS BY CONDITION

Variable	Condition			
	No treatment	Random	Predict	Control
Change in "Usual Day" <sup>a</sup>	-1.49	+1.31	+1.47	+2.18
Change in "Future Commitments" <sup>a</sup>	-.40	+.05	+.27	+.50
Change in Activity Index <sup>a</sup>	-.60	.00	+1.30	+1.00
Triscale composite on activity <sup>b</sup>	19.40	19.50	22.10	22.30

<sup>a</sup> Positive numbers represent increases, negative numbers decreases.

<sup>b</sup> The higher the score, the more active the individual perceives himself to be.

= 6.133,  $p < .018$ , than no-treatment and random subjects.

The comparison between random and no-treatment groups revealed one significant univariate  $F$ ,  $F(1, 36) = 5.08$ ,  $p < .03$ , for change in "Usual Day" and one marginally significant univariate  $F$ ,  $F(1, 36) = 3.849$ ,  $p < .058$ , for change in "Future Commitments." On both measures, the random group was superior to the no-treatment group. However, since the multivariate  $F$  for this comparison was not statistically significant, these univariate  $F$ s must be viewed with some caution. It is possible that they are merely chance effects.

#### *Direction of Effects*

Since several of the dependent measures were change scores, it is possible to say something about the directional effects of the manipulations. That is, did the manipulations inhibit a progressive decline or did they actually effect improvement? The mean changes for indicators of physical status in Table 1 show that all groups increased their intake of drugs and number of trips to the infirmary, but that this increase was smallest for the predict and control groups. Thus, in the case of health status indicators, the manipulations effectively inhibited a progressive physical decline. Mean changes in indicators of psychological status and activity level suggest, however, that the manipulations actually reversed the pattern of progressive decline. Tables 2 and 3 show that, on the average, predict and control groups evidenced a positive increase, while the no-treatment and random groups showed a slight decrease.

#### DISCUSSION

The results of this study demonstrated that predict and control groups were consistently

and significantly superior on indicators of physical and psychological status, as well as level of activity. The manipulation of control and predictability had meaningful generalized effects on the well-being of the institutionalized aged subjects of this study. The absence of significant differences between the predict and control groups and between the random and no-treatment groups suggests that the relatively positive outcome of the predict and control groups is attributable to predictability alone. These data paralleled the findings of Reim et al. (1971) who also failed to find generalized advantages of controllability over predictability. No predictability-control differences on proofreading ability, assessed after the noise experiences, were found in their study.

Despite the similarities in results, some important differences between this and previous control studies should be noted. First, both Reim et al. (1971) and Geer and Maisel (1972) used predictable or controllable aversive events (loud noise and photographs of mutilated bodies, respectively), while a positive event was used in the present study. Second, differences between predictability and control found in previous studies were obtained on physiological indicators (vasoconstriction and galvanic response) taken in the presence of the stressor; such measures were unavailable in the present study and it is therefore impossible to know whether such differences existed. The third difference between the present study and previous research is that individuals in this experiment were given control over another human being whereas subjects in previous studies were given control over impersonal physical events. Undoubtedly, the exercise of control in the present study was limited by considerations

for how the demands might be perceived, as well as by situational constraints against inappropriate behavior. Experience gained from the present investigation suggests that it would be easier to differentiate predictability from control if the thing to be predicted or controlled were something inanimate such as a food menu or aspects of the physical environment rather than another human being. From an applied perspective, it is important to continue the search for an answer to the predictability-control issue since in most settings it is easier to make an environment predictable than controllable.

It was expected that subjects in the random group would benefit from being visited even though the visits were not predictable. Since being visited was conceptualized as a positive event, it was thought that a visit would be analogous to being pleasantly surprised. Apparently, this was not the case. Random subjects were not significantly or consistently superior to the no-treatment subjects in any category of variables. Several explanations may account for this absence of difference.

First, it is possible that, because of its unpredictability, the quality of the interaction between visitor and random subjects was very inferior, perhaps even aversive, when compared to the quality of interaction occurring in the predict and control conditions. The subjects' ratings of their enjoyment of the visitation experience contradicts this explanation, however. Random subjects reported enjoying the visits just as much as predict and control subjects. The differences between the subjects' enjoyment of the visits and their enjoyment of "their favorite activity" were also not significant across the three conditions. Thus, subjects in the random group apparently enjoyed the visits just as much as subjects in the predict and control groups. It is possible, then, that a positive event has generalized benefits only to the extent that the individual has the opportunity to look forward to it (it is predictable). Extensive correlational and observational research with hospital patients supports the notion that having something positive to look forward to is beneficial to a speedy recovery (Schulz, Note 2).

The relevance of these findings to the

process of aging is evident. This study demonstrates that the decline in physical and psychological status and level of activity associated with increased age can be inhibited or reversed by making a predictable or controllable significant positive event available to aged individuals. The study further supports the conceptualization that the many negative consequences of aging may be mediated by increased unpredictability and uncontrollability and that, to the extent that aged individuals are able to maintain a predictable and controllable environment, they should experience relatively less physical and psychological deterioration with increasing age.

The idea that the aged should have the opportunity to retain as much autonomy in their lives as possible is not new to gerontologists. Pfeiffer (1973), at a recent conference on alternatives to institutional care for older Americans, remarked that total care for the aged is just as bad as no care at all. Brody (1973) is at present carrying out some research on alternatives to institutionalization which emphasizes the importance of enabling the aged individual to retain some autonomy in his environment. These gerontologists appear to have reached their conclusions on the basis of intuition, personal experience, and a large body of correlational research. The present investigation supports their points of view and suggests some specific psychological variables which appear to be causally related to successful aging. A qualification is in order here. The population used in this study was of relatively high socioeconomic status and caution is therefore advised before generalizing to all aged individuals. Future research should investigate other populations as well as individual differences within those populations.

Finally, we know little about the process through which control and predictability come to have their effects on the individual. In order to begin to construct a model that would enable us to predict the impact of these variables at any given point in a person's life, we need to collect data on individual differences. It is probable that the kind of life experiences an individual has had contributes greatly to his expectancies for a controllable and predictable world and that his response to a particular environment is affected by

the degree to which these expectancies are violated.

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