Evaluation in Practice

A Methodological Approach

SECOND EDITION

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CHAPTER 7

Posttest-Only Control Group Design

The posttest-only control group design is a variation on the pretest-posttest design and the Solomon design. The major difference is that it omits the pretested groups altogether. The posttest-only control group design is illustrated in table 7.1.

Under this design, individuals are randomly assigned to groups E (experimental group) or C (control group). The first group is subjected to the treatment, and progress is measured during or after the program.

Nachmias aptly describes the advantages:

> The . . . design controls for all intrinsic sources of invalidity with the omission of the pretest, testing and instrument decay become irrelevant sources of invalidity. It can also be assumed that the remaining intrinsic factors are controlled, since both groups are exposed to the same external events and undergo the same maturational processes. In addition, the extrinsic factor of selection is controlled by the random assignment of individuals, which removes an initial bias in either group. (1979, 32)

What all this means is that, with random assignment, a pretest may be unnecessary. This provides some distinct advantages. For one thing, it is sometimes difficult to convene subjects for a pretest before a study. For another, repeated measurement can sometimes be expensive in terms of time and resources. In addition, some evaluations are quite transparent, and the researcher may wish to disguise the purpose of the experiment or even hide the fact that the study is in progress. Finally, it is possible that the pretest may cause the subjects to react differently to the treatment—the pretest sensitization problem. To the extent that this problem exists, it is obviously eliminated if there is no pretest.

Why then have a pretest at all? If the posttest-only control group design is so good, why ever use the pretest-posttest control group design? One reason is that a pretest allows the evaluator to reduce the size of the sample (and thus reduce costs). The pretest itself is used statistically as a controlling variable in a repeated measures analysis of either variance or covariance. When subjects are in limited supply, a pretest is typically recommended (Bausell 1986, 93).

TABLE 7.1
Posttest-Only Control Group Design

	Pretest	Program	Posttest
Group E		X	O
Group C			O

Another good reason exists for having a pretest. It provides a good check on the randomization process. Without a pretest, one presumes but does not know that random assignment causes the experimental and control groups to start out at the same point, but one can never be absolutely sure. The pretest thus allows us to test for differences in the two groups that could be accounted for by what Lawrence Mohr terms "unhappy randomization" (1988, 46).

Finally, there is always a concern about client preference. Clients frequently feel more comfortable with a pretest. Evaluators can point out the redundancy of a pretest, but if the client is not happy, a pretest may be appropriate. For these reasons, the pretest-posttest design is much more popular than the posttest-only design (even when the posttest-only design is perfectly appropriate). The following article, "Community Post-hospital Follow-Up Services" by Ann Solberg, is an example of the posttest-only control group design.

READING

Community Posthospital Follow-up Services

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Clients ready for discharge from the Fresno County Department of Health Acute Psychiatric Unit were randomly assigned to an experimental group (n = 71) or a control group (n = 72). The individuals in the experimental group received community follow-up services from one of four psychiatric social workers for a period of 30 days after their discharge from the acute psychiatric unit. The control group received no follow-up services from the project staff. The evaluation of the project was based on a period of 60 days following each client's discharge from the hospital. The results showed that posthospital community follow-up, as provided in this demonstration project, is effective in preventing or at least delaying rehospitalization, without increasing the cost of mental health care.

AUTHOR'S NOTE: *This demonstration project was supported by the California State Department of Health. I wish to acknowledge the project staff: Shirley Carlson, LCSW; Joan Poss, MSW; Donna Ward, MSW; Jane Van Dis, MSW; Alice Sutton, MSW; and Daniel Hart, MSW. Others who facilitated the project were Jeanne Book, Ph.D.; Keith Goble, LCSW; Chris Christenson, LCSW; Denise Gobel, B.A.; and Detlev Lindae, Ph.D. Correspondence may be directed to Ms. Solberg at the Fresno County Department of Health, P.O. Box 11867, Fresno, CA 93775.*

IN COMMUNITY MENTAL HEALTH CENTERS the psychiatric unit is only one phase in the continuum of mental health care. The role of the psychiatric unit is to stabilize acutely ill clients and refer them to other mental health services for continued care. These programs are referred to as posthospital or aftercare programs when they are included in the discharge plan of a client who has been hospitalized.

There is a general consensus among mental health professionals that attending posthospital programs is necessary to the client's continued progress and avoidance of rehospitalization. However, many discharged

patients referred to such programs do not complete the referrals. Bass (1972) pointed out that the operational principles for maintaining the continuity of treatment were specified as requirements for federally funded centers. Therefore, it is the responsibility of each mental health center to promote continuity of care within its own system. Wolkon and associates (1978) concur that it is the responsibility of the community mental center to help discharged patients take advantage of needed services.

Studies in which the problem of rehospitalization has been examined from the viewpoint of aftercare program attendance have yielded inconsistent results. While most studies have shown that rehospitalization rates are lower for individuals who receive aftercare services compared to those who do not (Free and Dodd, 1961; Beard et al., 1963; Hornstra and McPartland, 1963; Mendel and Rappaport, 1963; Greenblatt et al., 1963; Purvis and Miskimins, 1970; Anthony and Buell, 1973; Smith et al., 1974; Winston et al., 1977), other studies show no differences between aftercare and no-aftercare groups (Brown et al., 1966; Michaux et al., 1969; Mayer et al., 1973; Franklin et al., 1975). Kirk (1976) attributes these diverse findings to differences in methodology, outcome measures, length of follow-up, type and size of patient samples, and treatment settings. Winston and associates (1977) identified the lack of systematic comparison of study groups as another possible source of conflicting results. Studies in which individuals who have attended aftercare programs were compared to those who have not, may have been confounded by subject variables stemming from the process of self-selection.

The purpose of this article is to present the results of a 3-month demonstration project that ended in July 1980. The purpose of the project was to evaluate the effectiveness of community follow-up services in reducing both rehospitalization and the overall cost of mental health care of individuals hospitalized at the Fresno County Department of Health (FCDH) Acute Psychiatric Unit (APU). Clients discharged from the APU were randomly assigned to either the experimental group or the control group. The control group received only those aftercare services for which they completed referrals or services that they sought on their own. The experimental group received additional posthospital follow-up services from a team of four psychiatric social workers for a period of up to 30 days following their discharge from the APU. The follow-up team worked with clients, their families, and other treatment staff with the goals of improving clients' personal and community adjustments and increasing their involvement with the aftercare programs (outpatient, partial day, or residential) to which they were referred by APU staff. The follow-up services were treated as an additional aftercare service. They were intended to supplement rather than substitute for aftercare services specified in a client's discharge plan.

The effectiveness of the project was evaluated by comparing the two study groups on selected outcome measures. The evaluation period lasted for the 60 days following each client's discharge from the APU. The decision to extend the evaluation period was based, in part, on a statistical consideration. The total number of clients rehospitalized from both study groups was larger in the 60-day period. The larger sample improved the discriminating power of the test used to compare the survival rates of the study groups. In addition, it was believed that any beneficial effects produced by the follow-up services should extend beyond the service period. In this study no attempt was made to associate client characteristics with differences in predisposition to hospitalization or in relative success in the follow-up project.

Two hypotheses concerning the effectiveness of the follow-up services were tested.

(a) The follow-up services will prevent or at least delay the rehospitalization of clients.
(b) The follow-up services will reduce the cost of mental health services.

Method

Subjects

The population studied was defined to include all persons who were hospitalized at the Fresno County Department of Health (FCDH) Acute Psychiatric Unit (APU), with the exception of individuals meeting one or more of the following disqualifying criteria:

(1) residence outside of Fresno County,
(2) supervision by the law enforcement system,
(3) referral to alcohol or drug abuse programs,
(4) referral to FCDH Advocate program,
(5) referral to subacute locked facilities,
(6) transfer to a psychiatric unit in another hospital.

These criteria helped ensure that the subjects (1) would be accessible to the follow-up workers, (2) were not in need of specialized treatment programs, (3) did not have another mental health worker supervising their treatment plan, and (4) would return to the APU in the event of future need for hospital services.

The sample consisted of 143 persons discharged from the APU during a three-month period ending in July 1980. The subjects were randomly assigned to two groups—experimental and control—upon their discharge from their first hospital episode during the study period. (The first hospital episode was not necessarily the first hospital admission in the client's psychiatric history.) There were 71 subjects in the experimental group and 72 subjects in the control group. The experimental group received the posthospital follow-up services for 30 days, and the control group did not.

The characteristics of the experimental group were as follows: females (45%); males (55%); age ($X = 29.4$; $SD = 10.8$); psychoses (51%); neuroses (49%); global impairment rating ($X = 3.6$; $SD = 1.2$). Similarly, the characteristics of the control group were as follows: females (43%); males (57%); age ($X = 32.8$; $SD = 12.1$); psychoses (51%); neuroses (49%); global impairment rating ($X = 3.6$; $SD = 1.3$).

Measures and Analysis

Information for testing the hypotheses was based on a 60-day evaluation period following each client's discharge from his or her first hospital episode during the study period. Hospital data were limited to hospitalizations taking place at the APU. Following clients closely for 60 days to record possible admissions to other hospitals was neither practical nor necessary. The likelihood that rehospitalization would take place at the APU was increased considerably by including in the sample only those persons who completed their hospital episode at the APU, rather than being transferred to another facility. The exceptions (hospitalizations at other facilities) were treated as a random variable, assumed to affect both study groups equally.

Survival Time

Survival time was defined as the length of time between a client's discharge from the first hospital episode and the onset of their first rehospitalization at the APU during the 60-day evaluation period. The 60-day fixed evaluation period resulted in incomplete information (censored observations) on the actual length of survival for many of the clients. All that is known about these clients is that they did not return to the hospital for at least 60 days after their first hospital episode. The test developed by Gehan (1965), which com-

pares two groups with respect to the length of survival when one or both samples contains censored observations, was used in this study.

Cost Analysis

There were three sources of mental health care costs included in the cost analysis: (1) the cost of rehospitalization, including treatment and intake evaluations at outpatient clinics; (2) the cost of aftercare program participation; and (3) the cost of the follow-up services, which were applicable to the experimental group only. Overhead expenses were included in all cost categories.

Procedure

Clients were assigned to groups at the time of discharge from their first hospital episode during the study period. Clients were not considered for reassignment upon their discharge from subsequent hospitalizations. A clerk at the APU notified the research assistant as soon as the decision to discharge a client had been reached. The research assistant determined, based on the aftercare referrals made for the client by APU staff, if the client being discharged met the target group criteria. A client who met the target group criteria was randomly assigned to the experimental group or the control group by the research assistant using a group assignment sheet. The assignment sheet was prepared by the project evaluator prior to the study using the one-digit columns of a table of random numbers. The numbers were assigned to subjects according to their order of appearance, beginning at the top of the column and progressing downward. Even numbers designated assignment to the experimental group and odd numbers designated assignment to the control group. The last subject was assigned 30 days prior to the last day of the study period to allow for a full 30 days of follow-up. Precautions were taken to ensure that the assignment of clients to groups was not biased by special interests. The APU staff were not informed about the target-group criteria. The project social workers and evaluator were not involved with subject assignment beyond defining the target group and preparing the initial assignment list based on the table of random numbers.

The research assistant contacted one of the social workers when a client was assigned to the experimental group. The social workers then decided among themselves who would accept the case, considering immediate availability and size of caseloads. After reaching a decision, a social worker met the client at the APU. Within 24 hours, the social worker made the first home visit. Follow-up services were provided for a period of 30 days after a client's initial discharge from the APU during the study period. Clients were given only one follow-up period, regardless of subsequent hospitalizations. At the end of the 30-day period, the social worker discharged the client from the follow-up project and made referrals to aftercare programs according to the client's need for continued care.

The project evaluator collected the data for the outcome measures and made periodic visits to the project site. Information regarding hospitalizations was obtained from records at the APU. A 24-hour report showed the date and time of admission and discharge. Aftercare program participation was obtained from the FCDH management information system (MIS). The type and frequency of follow-up contacts were recorded by the project social workers. Cost information was obtained from the MIS and the accounting office.

Results

Description of Follow-up Services

Of the group of 71 clients who received follow-up services, 58 (82%) were seen by a social worker at the APU prior to their dis-

charge. Forty-six clients (65%) received a home visit within 24 hours of their discharge. The clients, as a group, received a total of 546 client contacts (face-to-face and telephone contacts) during the 30-day follow-up period. The median number of contacts was five per client. Collateral contacts—a second category of follow-up contacts—included face-to-face and telephone contacts with mental health staff and family members. There were 551 collateral contacts in the 30-day period, with a median of four contacts per client. Figure 1 shows the percentage of total client contacts (546) and total collateral contacts (551) that were provided each day of the 30-day follow-up period. Not shown on this figure are 19 client and 42 collateral contacts that took place after the 30-day follow-up period ended. It was not in the best interest of 26 (37%) clients to discharge them on precisely the 30th day.

There were 54 clients (76%) who are identified as "service completers," because they cooperated with the social workers throughout the 30 day period. The other 17 clients (24%) were designated as drop-outs because they refused services during the first few contracts or were resistive to the extent that the social workers stopped initiating contact with them before the follow-up period ended.

Hospital Contacts

During the 60-day evaluation period, 8 experimental subjects (11.3%) and 20 control subjects (27.8%) were hospitalized at least once. Two experimental subjects and four control subjects were rehospitalized twice. Clients in the experimental group were in the hospital a total of 83.9 days, compared to 206.6 days accumulated by the control group. The total hospital days for the control group was estimated for 71 clients by multiplying the group average, based on 72 clients, by 71.

The survival-time distributions for the study groups are presented in Figure 2. Comparing the groups on survival time, the results of Gehan's test support the hypothesis that the follow-up services are effective in preventing or at least delaying the recurrence of hospitalization ($V = 2.77$; $p < .05$). The median survival time for the experimental

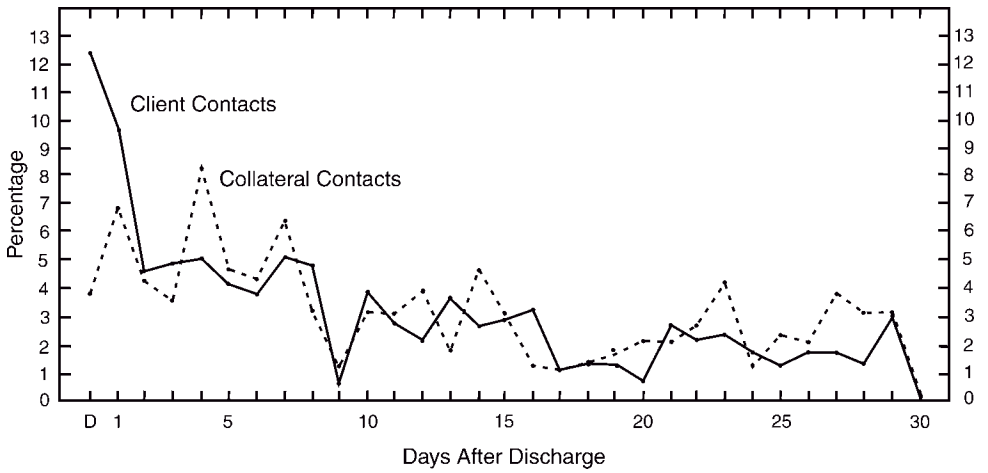

FIGURE 1

Percentage of Client and Collateral Follow-Up Contacts Received by Experimental Group Subjects Each Day of the 30-day Follow-Up Period

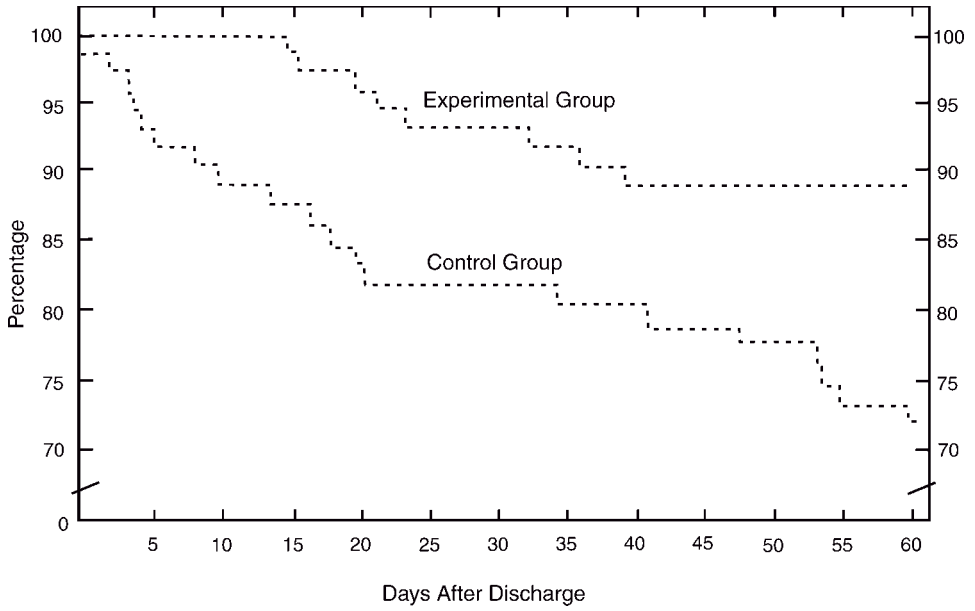

FIGURE 2
Survival Rates for Study Groups

group was 22.8 days, compared to 17.4 days for the control group. Also, none of the experimental subjects was rehospitalized within 14 days of discharge from the APU, compared to nine control subjects (12.7%) who were rehospitalized during the same period. The two-week period after discharge has been identified as a period of high risk for rehospitalization.

Cost of Mental Health Care

Table 1 shows the cost of mental health care for the study groups during the 60-day evaluation period. The total cost for the experimental group ($60,165) was $10,298 less than the total cost for the control group ($70,463). The t-test for these outcomes showed no significant differences between the two groups regarding total program costs ($t = 1.21 < 1.96$; $p > .05$). The total hospital cost (Acute Psychiatric Unit) was $13,407 for the experimental group and $49,703 for the control group. A significant difference was found between the two groups, indicating a reduction in the cost of hospitalization for the experimental group ($t = 8.50 = 1.96$, $p = .05$). The cost of aftercare services was observably higher for the experimental group ($25,093) compared to the control group ($20,760), but the *t*-test showed that the costs were not statistically different from one another ($t = 1.18 < 1.96$, $p > .05$). The cost figures for aftercare services were based on 439 aftercare contacts for 40 experimental subjects and 355 aftercare contacts for 37 control subjects.

Discussion

In this study, the event of readmission was used as a complex index of the individual's overall adjustment and acceptance by the family and community. Solomon and Doll (1979) have indicated that there are many factors that contribute to a decision to rehospitalize a person, other than the individual's psychiatric status. These include family and community acceptance of the individual,

TABLE 1
A Comparison of Study Groups on the Cost of Mental Health Care During a 60-Day Period After Subjects' Discharge from Acute Psychiatric Unit

	Experimental Group		*Control Group*		
Cost Components	*Total*	*SD*	*Total*	*SD*	*t*
Acute Psychiatric Unit	$13,407	$15,882	$49,703	$32,583	8.50*
Aftercare Services	$25,093	$24,072	$20,760	$19,733	1.18
Follow-up Services	$21,665	$15,219	—	—	
Total	$60,165	$40,650	$70,463	$52,313	1.32

Note: The cost of follow-up services includes the salaries of 3.5 full-time equivalent psychiatric social workers, a part-time psychiatric social worker supervisor, a full-time research assistant, supplies, travel expenses, and all overhead expenses.
*$p \leq .05$.

characteristics and perceptions of admitting personnel, factors in the mental health delivery system (e.g., hospital policies, census, and availability of community alternatives), and the individual's perception of the hospital as being a solution to his or her problems. The follow-up team dealt with all factors that had the potential for increasing a client's community tenure. Rehospitalization was considered only when no other solution could be found.

The results showed that community follow-up services, as provided in this demonstration project, provide an effective means of reducing the rehospitalization of individuals who have been hospitalized in a short-term acute psychiatric facility at the Fresno County Department of Health. The results of the survival-time analysis showed that the follow-up services were effective, at least in delaying further hospitalizations. Many clients who received follow-up services and were not hospitalized during the 60-day evaluation period may have been hospitalized afterward. While it is doubtful that clients with a history of relapse will be prevented from ever returning to the hospital, persons whose psychiatric condition is not chronic are more likely to have future hospitalizations prevented altogether. Because not all rehospitalizations can be prevented, the follow-up period should be renewed each time a person is hospitalized. The limit of one follow-up period in this study was a requirement of the design used for the evaluation.

The cost analysis showed that the savings in hospital costs were substantial ($36,296). The follow-up staff stated that they could have served an additional ten cases (total 81) without reducing the effectiveness of their follow-up efforts, and therefore, the potential for savings may be somewhat underestimated. In addition, the cost analysis showed that there were no significant increases in aftercare program costs nor in total mental health care costs as a result of adding the follow-up component to the service delivery system. In other words, the savings in hospital care paid for the additional cost of providing follow-up services.

Factors in the follow-up model that are believed to be effective in reducing hospitalization include (1) an assertive approach to follow-up, (2) contact with the client and staff prior to the client's discharge, (3) more frequent contact in the beginning of the follow-up period, (4) services provided to the client in his or her natural environment, and (5) the role of follow-up workers as case managers. The follow-up workers were strongly encouraged to contact clients more often at the beginning of the follow-up period. Consequently, most clients (82%) received an initial visit by a follow-up worker on the psychiatric unit, and a greater percent-

age of contacts took place early in the follow-up period. Previous readmission data for the psychiatric unit in this study have consistently shown that a greater percentage of clients return within the first two weeks after discharge than during any other time period up to 90 days after discharge. Therefore, follow-up services were especially emphasized during the early days of the follow-up period—identified as a high risk period. The effectiveness of this strategy was demonstrated by the result that none of the experimental subjects returned to the hospital within two weeks after their discharge from the psychiatric unit, whereas nine control subjects were rehospitalized during the same period.

Because this study was carefully conducted, following principles of controlled research, it is believed that these results can be replicated using different samples from the same population. The decision to continue the project was based on this rationale. However, there will be two changes in the follow-up procedure. First, the follow-up period will be renewed each time a client is discharged from the hospital. A second change will allow the follow-up period to vary between 30 and 40 days. The social workers judged that for about one-third of the clients, a strict adherence to a 30-day period may result in abrupt discharges, which are potentially detrimental to their progress.

It is believed that posthospital community follow-up services have a likelihood for simlar success in other locations. Characteristics that are unique to clients in other settings may need to be considered in developing an effective follow-up strategy.

Summary

The purpose of this project was to evaluate the effectiveness of community follow-up services in the context of a true experimental design. One hundred forty-three clients ready for discharge from the Fresno County Department of Health Acute Psychiatric Unit were randomly assigned to either an experimental group or a control group. There were 71 subjects in the experimental group and 72 subjects in the control group. The individuals in the experimental group received community follow-up services from one of four psychiatric social workers for a period of 30 days after their discharge from the acute psychiatric unit. The control group received no follow-up services from the project staff.

The evaluation period lasted for 60 days following each client's discharge from the hospital. The results showed that posthospital community follow-up, as provided in this demonstration project, is effective in increasing the survival time of clients and in reducing the cost of mental health care. The survival time—length of time outside of the hospital—was significantly greater for the experimental group compared to the control group ($p \leq .05$). The median survival time for the experimental group was 22.8 days and for the control group, 17.4 days. The percentage of experimental subjects who were rehospitalized (28%), and the number of hospital days for the experimental group (84) was less than one-half the number of hospital days for the control group (207). The savings in hospital costs ($35,896) more than paid for the cost of the follow-up services ($21,665), and the total cost for the experimental group ($60,165) was $10,298 less than the total cost for the control group. It was concluded, based on the results of the cost analysis, that hospital expenditures were substantially reduced, and this savings paid for the cost of the follow-up program.

Note

1. One of the four social workers left the project during the fifth week. This social worker was not replaced, because the project was found to be overstaffed relative to the number of clients being included as experimental subjects.

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Explanation and Critique

One of the most interesting facets of program or policy evaluation is that real-world projects do not always exactly fit the model. In fact, they seldom do. The article by Ann Solberg is a perfect example. As we have seen, Solberg's research reported on a project to evaluate the effectiveness of community follow-up services in reducing both rehospitalization and the overall cost of mental health care of individuals hospitalized at the Fresno County Department of Health Acute Psychiatric Unit (APU). Solberg details:

> Clients discharged from the APU were randomly assigned to either the experimental group or the control group. The control group received only those aftercare services for which they completed

> referrals or services that they sought on their own. The experimental group received additional posthospital follow-up services from a team of four psychiatric social workers for a period of up to 30 days following their discharge from the APU. The follow-up team worked with the clients, their families, and other treatment staff with the goals of improving clients' personal and community adjustments and increasing their involvement with aftercare programs (outpatient, partial day, or residential) to which they were referred by APU staff. The follow-up services were treated as an additional aftercare service. They were intended to supplement rather than substitute for aftercare services specified in a client's discharge plan.

When one thinks of the posttest-only control group design, eliminating the pretest comes to mind. For example, one might envision an experimental reading program in which students are randomly assigned to experimental and control groups and are given reading tests before and after the program. In the posttest-only design, the pretest is simply eliminated—knowing that random assignment has, in effect, made the two groups equal and thus the pretest unnecessary.

In Solberg's evaluation, however, a pretest was not possible. What could be pretested? Nothing. Thus, in evaluations such as this, the pretest-posttest design and the Solomon Four-Group Design are not used because they cannot be used. Also, as we know, the design is a valid experimental design in its own right and even has advantages over other forms of experimental designs (e.g., the threat of the testing effect).

In examining Solberg's research, consider her application of the posttest-only control group design. The randomized assignment was obviously the key to the validity of the design, but this was not the only strength of the paper. For one thing, Solberg provided data on the characteristics of the experimental group and the control group (gender, age, psychosis, neurosis, global impairment rating). Given the fact that randomized assignment of the patients was used, presentations of such comparisons was not really necessary. In the introduction to Part II of this volume, "Experimental Designs," it was stated that as long as the number of subjects is sufficiently large, random assignment guarantees that the characteristics of the subjects in the experimental and control groups are statistically equivalent.

With only seventy-one subjects in the experimental group and seventy-two in the control group, Solberg apparently wanted to assure the reader that the groups were, in fact, statistically equivalent. A nice touch.

This discussion has emphasized the fact that the key to experimental designs is random assignment. Random assignment, again, means that the treatment or program to which the subject is assigned bears no relation to any characteristic of the subject. It is important, however, that random assignment be distinguished from random selection.

To illustrate, look again at the Solberg article. Solberg first selected the subjects of her study from the Fresno APU. To achieve true external validity, she should have selected subjects at random from the population of persons discharged from psychiatric hospitals. For Solberg to do this, however, the costs would have been prohibitive. Instead, she randomly assigned all subjects discharged from the Fresno County Department of Health Acute Psychiatric Unit who met the inclusion criteria to experimental and control groups. This procedure reduced the generality of findings, but it also reduced costs and random errors. Random selection is not a requisite for a true experimental design (Langbein 1980, 67–68). Solberg abandoned random selection entirely (but not random assignment) but still has a valid experimental design. However, she lost generalizability.

This is an example of one of the trade-offs discussed in chapter 1. To her credit, Solberg was very careful about this. She reported the following:

> The results showed that community follow-up services, as provided in this demonstration project, provide an effective means of reducing the rehospitalization of individuals who have been hospitalized in the short-term acute psychiatric facility *at the Fresno County Department of Health*. [emphasis added]

Solberg is certainly correct in not generalizing beyond this unit.

Overall, although we may have questions about some segments of Solberg's article (e.g., How were hospitalization costs determined?), the research reported provides a fine example of the posttest-only control group design.

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