Measuring the intervention in effectiveness research.

by Souraya Sidani

Inconsistent implementation of the intervention in the field setting presents a threat to the validity of the conclusions of an effectiveness study. Inconsistent implementation results in variability in the actual dosage of the intervention received by the participants, which leads to variability in outcomes achievement and, consequently, to Type II error. This article discusses the methodological implications of inconsistent intervention implementation and advances a strategy as a solution to this problem. The strategy proposes to quantify the dosage of the intervention as a continuous variable and to use this variable in the statistical analysis. The benefits of this strategy are illustrated with an empirical example from the Self-Help Intervention Project.


The social mandate of the nursing profession is to provide high quality care that results in the best outcomes to clients. Providing care and improving its quality requires the development of a sound knowledge base that guides the clinical decision making regarding selecting and implementing the interventions that are most effective in producing favorable changes in the clients' conditions. The development of this knowledge base is achieved by critically evaluating the effectiveness of nursing interventions in producing desired client outcomes. The results obtained from such studies are essential for delineating, advancing, and refining the clinical knowledge base. Findings of studies evaluating nursing interventions should be critically appraised for their validity as they form the evidence on which nursing care is based.

Evaluating interventions is programmatic, occurring in two phases. In the first, referred to as efficacy research, the intervention is studied under controlled conditions. The controlled conditions are conducive to the creation of the ideal conditions under which the intervention is expected to produce the intended effects. Once its initial efficacy is established, the second phase, thereafter called effectiveness research, consists of examining the effectiveness of the intervention as implemented in the field, that is, in the practice setting in which it will be ultimately applied.

Evaluating the intervention in the field presents some difficulties. The practice setting is complex, and does not lend to adequate control of the intervention implementation (Kirchhoff & Dille, 1994). Inadequate control of the intervention implementation yields to its inconsistent delivery across clients assigned to the experimental group. Inconsistent intervention delivery may result in differences in how much of the intervention is actually received by the clients—that is, some clients in the experimental group may receive more or less of the intervention. In turn, these differences lead to variability in outcomes achievement among the experimental clients, which reduces the statistical power to detect significant intervention effects. Therefore, the chances of committing Type II error—that is, claiming that there is no difference between the experimental and control groups when, in reality, there is a difference—are increased. The validity of conclusions regarding the effectiveness of the intervention in achieving the desired outcomes is threatened (Lipsey, 1990; Scheirer & Rezmovic, 1983).

The findings of effectiveness research may be misleading, forcing scholars to abandon nursing interventions that could be potentially beneficial to clients if the problem of inconsistent intervention implementation is not addressed. Finding a solution to the problem of inconsistent intervention delivery in effectiveness research, defined here as how much of the intervention is actually received by clients, is crucial for avoiding misleading results and for enhancing the validity of conclusions. In this article, the problem of inconsistent intervention implementation in the field setting is described, and its implications for the validity of conclusions in effectiveness research are discussed. A strategy for enhancing the validity of an effectiveness study conclusions is then presented. Finally, an empirical example is provided to illustrate the benefits of the proposed strategy.

THE PROBLEM OF INCONSISTENT IMPLEMENTATION

Evaluating the effectiveness of interventions as implemented in the field or actual practice setting requires the commitment and collaboration of nurse-clinicians and the cooperation and active involvement of clients. The researcher may request the assistance of clinicians in delivering the intervention. Although the clinicians are provided with training in implementing the intervention activities and are asked to adhere to the intervention protocol, they may not provide the intervention in the standardized amount prescribed by the researcher (Conrad & Conrad, 1994; Kirchhoff & Dille, 1994). Several factors, out of the researcher’s control, may influence the clinicians’ noncompliance with the intervention protocol.
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Examples of these factors are the ease with which the intervention is delivered, lack of or low staff commitment to the intervention (Sechrest, Ametrano, & Ametrano, 1983; Yeaton & Sechrest, 1981), and the tendency of clinicians to use their clinical judgments when providing the intervention (Goldfried & Wolfe, 1996; Jacobson & Christensen, 1996). That is, clinicians may be compelled to adapt the prescribed intervention to fit the demands of the situation they are in, or to meet the needs of individual clients. For instance, clinicians may provide more or less counseling sessions than specified in the protocol to assist a client in dealing effectively with her or his presenting problem.

Some nursing interventions are based on the active involvement of the clients in implementing them. Examples of such interventions include those aimed at health promotion, risk reduction, disease and complication prevention, or symptom management techniques. When the clients themselves are in control of performing the intervention activities, they may not comply with the intervention protocol (Donner, 1992). Lack of clients’ adherence to the intervention protocol could be related to various factors, such as lack of time or resources and unclear instructions. Clients may lack adequate knowledge of when to perform the prescribed intervention, at what level, how frequently, and for how long. For example, cardiac patients are often instructed to exercise on a regular basis, at home. If their exercise program is not well described and not closely supervised by a health professional, they may perform the exercises with different frequency. Some chose to exercise for 20 minutes three times a week, others may exercise for 10 minutes on a daily basis, and still others may exercise for 15 minutes, four times a week.

These differences in the delivery of the intervention result in its implementation in an inconsistent or nonuniform manner across the clients. Inconsistent implementation is manifested by variability in the level of the intervention that clients actually receive, leading to incorrect conclusions about its effectiveness.

Implications of Inconsistent Implementation

A consistent implementation of the intervention, usually made possible under well-controlled experimental conditions, indicates that all clients in the experimental group have uniformly received the same level of the intervention. Therefore, the intervention effects show up as a change, of a constant value, in each client’s score on the outcome variable of interest. The constant value could be small, medium, or large, and either negative or positive, depending on the hypothesized magnitude and direction of the effects (Lipsey, 1990). For instance, relaxation exercises can be expected to reduce anxiety, demonstrated in a reduction (i.e., a negative value) of, say, 10 points in the posttest anxiety scores of clients in the experimental group. In contrast, relaxation exercises can be expected to improve the clients’ sense of well-being, manifested by an increment (i.e., positive value) of, say, 5 points in their posttest well-being scores. The constant values added to, or subtracted from, the scores of clients who received the same level of the intervention, create the differences between the treatment and control group. Significant differences imply that the intervention is effective in producing the intended outcomes.

Inconsistent implementation, usually observed under the less controlled field conditions, yield to variability in the level of the intervention received by the clients in the experimental group. Thus, the uniformity of intervention receipt and, subsequently, of intervention effects is challenged (Cook & Poole, 1982). With the variability in the level of the intervention received, the amount of change in the outcome variables’ scores is not constant across the clients in the experimental group. For some, the amount of change is low, and for others, it is high, taking either a positive or negative value (Lipsey, 1990). This within-experimental group variability in the level of the outcomes achieved increases the error term (i.e., within-group variance) of statistical tests (e.g., t test or F ratio) used to examine the differences between the experimental and control groups. Increased within-group variance weakens the statistical power for detecting significant intervention effects, leading to Type II error (Cook & Poole, 1982; Lipsey, 1990; Mark, 1983; Rezmovic, 1984). Inconsistency in intervention implementation “obscures” the effects of the intervention (Yeaton & Sechrest, 1981); it presents a threat to the statistical conclusions validity of an effectiveness study (Cook & Campbell, 1979).

A STRATEGY FOR ENHANCING VALIDITY OF CONCLUSIONS IN EFFECTIVENESS RESEARCH

Researchers have been strongly encouraged to develop mechanisms for standardizing the implementation of the intervention to deliver it consistently in the field setting and to enhance the validity of effectiveness research. Standardization can be achieved by developing a protocol that describes the nature of the intervention activities, specifies the sequence of activities to be performed, and provides details for the procedures to be carried out; training the interveners in the intervention activities or procedures; pilot-testing the intervention to determine its feasibility and to...
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recognize and resolve potential problems in its implementation; and requesting the interveners to strictly adhere to the protocol when delivering the intervention (Kirchhoff & Dille, 1994; Sechrest et al., 1983).

Although these standardization mechanisms are essential for a consistent intervention implementation, they do not ensure it, and, thus, they do not enhance the validity of statistical conclusions. To be instrumental in meeting the goal of improved validity of conclusions, the standardization mechanisms need to be accompanied by a strategy for representing the level of the intervention actually received by the clients. Scheirer and Rezmovic (1983) explained,

To correctly attribute the observed outcomes of [an intervention] to the intervention, the researcher should have empirical evidence on the extent to which [the intervention was] implemented. Without such evidence, researchers may erroneously conclude that an intervention was ineffective when, in fact, treatment implementation was inadequate to afford a valid test of the [intervention]. (p. 599)

The strategy proposed here as a means for enhancing the validity of statistical conclusions in effectiveness research is based on considering the intervention a concept within the study framework. The intervention is represented as the independent variable that has a direct effect on the outcome variable(s). As such, the intervention must be measured (Dulock & Holzemer, 1991). Thus, the proposed strategy reflects the process of measuring the intervention and using this measure to represent the intervention in the statistical analyses (Sidani & Braden, 1998).

Measuring the Intervention

Measuring the intervention refers to the process of quantifying the extent of the clients’ exposure to the intervention (Reid & Hanrahan, 1988). The extent of exposure is operationalized as the level or dosage of the intervention that is actually received by the clients. The terms “dosage” and “dose” are used here interchangeably. The notion of dosage of an intervention is very similar to that of a medication dose. Dosage reflects the amount, frequency, and duration with which an intervention is given to produce the expected changes in outcomes (Sechrest et al., 1983). Amount refers to the quantity (i.e., how much) of the intervention activities that needs to be given. Frequency refers to the number of times the intervention activities are to be performed over a specified period of time. Duration refers to the total length of time the intervention is to be implemented for the expected effects to take place (Scott & Sechrest, 1989). The following are hypothetical examples illustrating the dosage of nonpharmacological interventions:

Listening to relaxing music: Clients are asked to listen to music for 20 minutes (i.e., amount), once a day (i.e., frequency), and as necessary (i.e., duration: unlimited) to relieve anxiety.

Client education: Cardiac patients are instructed in stress management techniques. Information on the effects of stress, on the types of stress management techniques, on the method or step-by-step procedure for performing each technique, and on their benefits is provided in five group sessions. Each session lasts 60 minutes (i.e., amount). One session is given per week (i.e., frequency) over a total of 5 weeks (i.e., duration).
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The dosage for some interventions is fixed—that is, the same intervention is given at a prespecified dosage that does not vary across client populations, settings, or conditions, or among individual clients (Yeaton & Sechrest, 1981). Examples of such interventions are immunizations. For other interventions, the amount, frequency, or duration aspects of dosage may vary (Yeaton & Sechrest, 1981). For instance, the amount of a counseling session may be fixed at 1 hour, but the frequency and duration of counseling differ among clients. The dosage of an intervention can be specified based on (a) the theory or theoretical framework underlying the intervention, (b) clinical experience and expertise, and (c) findings of previous effectiveness studies (Scott & Sechrest, 1989).

Once the dosage of the intervention is defined operationally, it needs to be quantified. The process of quantifying the intervention dosage consists of developing an instrument that permits collecting data about the intervention dosage, using the instrument to gather pertinent data, and creating a scoring scheme that reflects the dosage actually received by the clients in an effectiveness study. The instrument measuring the intervention dosage should assess its amount, frequency, and duration. It can be designed in different formats: a self-report questionnaire or checklist that can be completed by the clinician delivering the intervention or by the clients receiving or actively involved in implementing the intervention; a log or diary in which the clinicians, clients, or both report what they did, and when, how frequently, and how long; an observational measure that can be used by the investigator or his or her designate to record the dosage of the intervention given to the clients; and a semistructured interview with the clinicians, clients, or both (King, Morris, & Fitz-Gibbon, 1987; Kirchhoff & Dille, 1994; McGrew, Bond, Dietzen, & Salyers, 1994; Reid & Hanrahan, 1988). The particular format selected is based on the nature of the intervention activities. For instance, Archbold and colleagues (1995) evaluated a program designed to increase the preparedness and competence of family members providing long-term care for frail elder people. They recorded the number of home visits made to participants in the experimental group, the number of phone calls received from participants, and the type and number of strategies tried for each presenting problem, thereby capturing the dosage of the intervention given to the group of participants.

Reporting on the intervention dosage actually received by the clients in the experimental group is informative; however, such reporting is descriptive and does not contribute significantly to enhancing the validity of conclusions of an effectiveness study. What is needed is a scoring scheme that reflects the dosage received by each participant in the effectiveness study. This scoring scheme should then be used to represent the intervention in the statistical analyses.

REPRESENTING THE INTERVENTION IN THE STATISTICAL ANALYSIS

The statistical analysis conventionally recommended for determining the effectiveness of an intervention in producing the desired outcomes consists of comparing the clients assigned to the experimental group to those assigned to the control group on the outcome variables' scores, regardless of the dosage actually received. This kind of analysis is called intention-to-treat analysis. Intention-to-treat analysis is highly recommended by some methodologists, because it is believed to avoid biased estimates of the intervention effects. The biased estimates are due to the loss of group equivalence and to self-selection of participants into different intervention doses (Lewis & Machin, 1993; Mark, 1983; Newell, 1992). Nonetheless, ignoring the variability in the dosage received increases the likelihood of committing Type II error, as described earlier.

The strategy proposed here for representing the intervention in the statistical analysis is consistent with the notion advanced in the previous sections—that the dosage of the intervention varies among the clients and that this interindividual variability in the dosage should be taken into consideration to avoid misleading findings. Therefore, the dosage of the intervention, rather than the client’s group membership (i.e., experimental vs. control group), is used to represent the intervention in the statistical analysis. A continuous scoring scheme is developed for quantifying the intervention dosage. The continuous scoring scheme assigns a value of 0 for the clients who did not receive any dosage of the intervention; these clients include those assigned to the control group and those initially assigned to the experimental group but were not exposed to the intervention, for whatever reason. Clients in the experimental group are assigned incremental values on the variable representing the intervention dosage, where higher values indicate receipt of higher doses of the intervention. For instance, when evaluating the effectiveness of listening to relaxing music in reducing state anxiety, clients are instructed to listen to the music for 20 minutes. Some clients may not listen to music at all; therefore, they are assigned a value of 0 on the dosage variable. Other clients may listen to music for 5, 15, or 20 minutes. The actual number of minutes spent listening to music is used to quantify the intervention dosage for these clients.
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The intervention dosage variable is then used in the statistical analyses. The dosage variable, which is a continuous variable, is considered the independent variable; its effects on the outcome variables can be examined using regression analyses. When the outcomes are measured before and once after the intervention delivery (i.e., one posttest measure), regression analysis is conducted in two phases. First, the effects of the pretest on the posttest outcome scores are residualized to account for initial nonequivalence. Second, the residuals of the posttest outcome scores are regressed on the continuous intervention dosage variable (Reichardt, 1979).

When the outcomes are measured before and repeatedly after the intervention delivery (i.e., more than one posttest measure), individual regression analysis (IRA) is used to determine the effects of the intervention on the outcomes. IRA consists of two stages. In the first stage, the rate of change in the outcome across the occasions of measurement is described for each client participating in the effectiveness study. The rate of change is represented by a functional relationship between the outcome and time. This functional relationship is expressed in a regression equation; the It-coefficient obtained by this regression is the slope that describes the direction and rate of change in the outcome over time, for each participant. In the second stage, the individual slopes for each outcome variable are regressed on the intervention dosage variable in an attempt to determine the effectiveness of the intervention (for details, refer to Sidani & Lynn, 1993).

In the remaining part of this article, an empirical example is presented to illustrate the process of measuring, quantifying, and representing the intervention dosage in the statistical analysis of an effectiveness study.

Illustrative Example

The illustrative example is taken from the Self-Help Intervention Project (SHIP) (Braden, Mishel, Longman, & Burn, 1989).(1) The project consisted of evaluating three psychoeducational interventions that were provided to women with breast cancer receiving adjuvant therapy. The interventions were the Self-Help Course, the Uncertainty Management Intervention, and the Independent Study Self-Help course. The interventions aimed at assisting the women in their adjustment to breast cancer and its therapy. The self-help course, based on Braden’s Learned Response to Chronic Illness middle-range theory, is the intervention presented here for illustration. The self-help course is an educational intervention planned to enhance the women’s abilities to care for themselves. The course was designed to provide the women information about the disease, its treatment and associated side effects, and strategies for managing the side effects and for enhancing belief in self, problem solving, and cognitive reframing skills. Examples of strategies taught are the following: using resources, identifying physical and emotional symptoms, and learning about possible causes of the symptoms and, about methods for managing them.

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The course was operationalized into six class sessions. The dosage of the course was measured in the following way: each class session lasted 90 minutes (i.e., amount), and one session was offered per week (i.e., frequency), for a total of 6 weeks (i.e., duration). The dosage actually received by the women assigned to the self-help course experimental group was quantified as the number of class sessions they attended. The teachers who offered the self-help classes kept a record of the women’s attendance at the sessions. This record served as the instrument for measuring the dosage received. A continuous scoring scheme was used to represent the dosage variable in the subsequent analysis. Women in the control group and those in the experimental group who did not attend any of the classes were assigned a value of 0; for the remaining women, they were assigned values ranging from 1 to 6, based on the actual number of classes they attended.

A guide was developed for giving the course; it described the learning objectives, the content covered, the learning activities to be performed by the teacher and by the women attending the class sessions, and the amount of time allotted to each activity. The teachers were asked to comply with the plan of activities to maintain the consistency in delivering the class sessions.

The Outcomes

Although multiple outcomes were expected of the self-help course, those used for this illustration are increased knowledge related to cancer and its treatment, and improved self-care abilities. Knowledge was measured by a 24-item
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scale, developed by Braden for this study, to assess the women’s understanding of the disease pathophysiology, symptomatology, treatment and prognosis, self-care activities, and symptom management strategies. The total score reflected the total number of correct answers, with a higher score indicating adequate knowledge. The scale demonstrated internal consistency (Cronbach’s alpha = .83). Self-care abilities were measured with the Inventory of Adult Role Behaviors (IARB) and the Inventory of Adult Self-Care (IASC). The IARB is a 14-item scale adapted by Braden from Given’s (1984) Effect Scale. The items measure the degree to which individuals are involved in social and community activities, family roles, leisure and recreation, household duties, and visitation with friends. A visual analogue scaling format was used. A total score is computed with higher scores indicating more involvement in adult role activities. The IARB was internally consistent (Cronbach’s alpha = .94). The IASC is a 6-item scale developed by Braden to measure the role behaviors devoted to enhancing or main-mining health, such as reading about how to stay well, monitoring how one’s body feels, and adjusting activities to stay well. A visual analogue scaling format was used, with higher total scores reflecting more involvement in self-care behaviors. The IASC demonstrated internal consistency (Cronbach’s alpha = .80).

PROCEDURE

Women with breast cancer were referred to the project by staff in clinical settings. The inclusion criteria were the following: 18 years of age or older; able to read and write English; currently receiving adjuvant therapy for primary or recurrent cancer on an outpatient basis, including chemotherapy, radiation therapy, hormone therapy, hyperthermia, independently or in combination; and free of clinically diagnosed psychopathology such as major depression. After determining if the women met the inclusion criteria, and after obtaining their written consent, they were sequentially randomly assigned to the experimental and control groups. The outcome variables were measured at the following six points in time: at baseline (T1), at posttest (T2) within 2 weeks of the completion of the intervention, and at 3 months (T3), 6 months (T4), 9 months (T5), and 12 months (T6) following posttest (T2). The data were collected at a date, time, and place convenient to the women.

Sample

The initial sample of convenience consisted of 307 women who were randomly assigned to the experimental and control groups. As with other longitudinal research studies, a number of participants were lost at each point of data collection, resulting in a total sample of 62 women who completed the six measurements. Of the 62 women, 20 received the self-help intervention, and 15 were assigned to the control group. Data obtained from these 35 women are used here for illustration. The mean age of the 35 women was 57 years. The majority were high school graduates, married, and employed full-time. Most had stage 1 primary breast cancer with no metastasis, and were receiving chemotherapy.

Analysis

IRA was conducted to determine the effectiveness of the self-help intervention in producing the desired changes in the outcome variables. IRA was the appropriate statistical technique to use, because it allows examination of the change in the outcomes over the six points of data collection. As explained earlier, IRA was carried in two stages. In the first stage, the rate of change in the outcomes was calculated for each participating woman. In the second, the individual rate of change in the outcomes was regressed on the continuous intervention dosage variable.

To illustrate the benefits of quantifying the intervention with the actual dosage received by the clients, two statistical tests were done in the second stage of the IRA. First, an independent sample t test, exemplifying the conventional way of representing the intervention in the statistical analysis of an effectiveness study, was done; the t test examined differences in the rate of change in the outcomes between the experimental and control groups. Second, a regression analysis, illustrating the proposed method for quantifying the intervention, was done; the rate of change in the outcomes was regressed on the continuous dosage variable.

RESULTS

The self-help classes were delivered over a period of 6 weeks, with one class session lasting 90 minutes offered each week, as initially planned. Not all the women assigned to this experimental group were exposed to the full intervention dosage. The number of classes attended varied between zero and six. Two (10%) of the 20 women did not attend a single class. One (5%) attended three class sessions, 2 (10%) attended four sessions, 6 (30%) attended five sessions, and 9
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(45%) attended all six sessions.

The rate of change in the outcomes was represented by the slope (i.e., the [Beta]-coefficient) obtained in the first stage of the IRA. The individual slopes for knowledge, obtained from the 35 women in the experimental and control groups ranged from -.50 to .96, with an average of .42 (SD = .42). The average slope for the women in the control group was .35, indicating small gain in knowledge over the six points in time; the average slope for the women who received the self-help intervention was .56, indicating that the women’s level of knowledge increased over time. The slopes for the IARB scale varied between -.59 and .95, with a mean of .36 (SD = .43). The mean slope for the control group was .34, whereas the slope for the experimental group was .38, implying small but positive changes in the women’s involvement in adult role behavior over time. The slopes for the IASC scale ranged from -.82 to .82, with a mean of -.05 (SD = .48) for the total sample, -.09 for the control group, and -.02 for the experimental group, indicating that, on average, the women’s involvement in self-care did not change significantly with time.

The results of the independent t tests are presented in Table 1. Although the assumption of equality of variance was met, the t-test results showed that the rate of change in the three outcome variables did not differ between the women in the experimental and the control groups. These findings imply that the self-help intervention is not effective in producing its expected outcomes.

TABLE 1: Results of the Independent tTest

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>t-test Value</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>1.44</td>
<td>33</td>
<td>n.s.</td>
</tr>
<tr>
<td>IARB</td>
<td>2.20</td>
<td>33</td>
<td>n.s.</td>
</tr>
<tr>
<td>IASC</td>
<td>.40</td>
<td>33</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

NOTE: IARB = Inventory of Adult Role Behaviors; IASC = Inventory of Adult Self-Care. Independent variable: experimental or control group membership. Dependent variables: slopes representing the rate of change in the outcomes.

The regression analyses examined the effects of the intervention dosage on the rate of change in the outcome variables. The results (see Table 2) demonstrated that the dosage variable affected knowledge significantly, but did not have any effect on the variables measuring self-care abilities. The significant effect of dosage on knowledge indicates that the greater the number of sessions attended, the greater the knowledge gained by the women. This finding implies that the self-help intervention is effective in improving, at least, the women’s knowledge related to cancer and its treatment.

TABLE 2: Results of the Regression Analysis

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>[Beta]-coefficient</th>
<th>[R.sup.2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>.44</td>
<td>.19</td>
</tr>
<tr>
<td>IARB</td>
<td>.12</td>
<td>.01</td>
</tr>
<tr>
<td>IASC</td>
<td>.00</td>
<td>.04</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>8.16</td>
<td>1,33</td>
<td>.01</td>
</tr>
<tr>
<td>IARB</td>
<td>.55</td>
<td>1,33</td>
<td>n.s.</td>
</tr>
<tr>
<td>IASC</td>
<td>.06</td>
<td>1,33</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

NOTE: IARB = Inventory of Adult Role Behaviors; IASC = Inventory of Adult Self-Care. Independent variable: actual dosage received. Dependent variables: slopes representing the rate of change in the outcomes.

The results of the regression analysis relative to self-care abilities were not encouraging, whereas those pertaining to knowledge underscore the importance of quantifying the intervention in terms of its dosage and of representing the dosage as a continuous variable in the statistical analyses. The advantage of this strategy for measuring the intervention...
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In effectiveness research, the ability to account for the interindividual variability in the dosage of the intervention actually received and subsequently for the variability in outcomes achievement. Accounting for this variability reduces error variance and therefore increases the statistical power for detecting significant intervention effects. In fact, Cook and Poole (1982) reported that a 10% increase in statistical power was obtained by including a simple measure of treatment implementation in the analysis of data from an evaluation. Even larger gains in statistical power are achievable as researchers refine the measurement of treatment implementation. (p. 428)

CONCLUSIONS

Inconsistent implementation of the intervention in the field setting presents a threat to the validity of the conclusions of an effectiveness study. Inconsistent implementation results in variability in the actual dosage of the intervention received by the participants, which leads to variability in outcomes achievement and consequently to Type II error. A strategy was advanced as a solution to the methodological problem arising from inconsistent delivery of the intervention. The strategy proposes to quantify the dosage of the intervention as a continuous variable and to use this variable in the statistical analysis. The empirical example illustrated the benefits of this strategy; the strategy enhances the validity of the inferences made about the effectiveness of an intervention. The application of this strategy in future effectiveness research is encouraged but requires careful operationalization of the intervention.

NOTE

(1.) The Self-Help Intervention Project was funded by the National Cancer Institute (No. ROI CA48450). The results presented here may differ from those reported in other publications pertaining to the SHIP interventions. The difference is explained by the type of statistical analyses conducted and by the subgroup of subjects included. The data used for illustration in this article were obtained from a small subgroup of women who remained in the study over the six points of measurement.

REFERENCES


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