Occupationally Embedded Exercise Versus Rote Exercise: A Choice Between Occupational Forms by Elderly Nursing Home Residents

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Key Words: aging • motivation • therapeutic exercise

Objectives. The provision of options in the occupational form that encourages meaningful choices and subsequent purposeful occupational performances is a basic premise of occupational therapy. This study examines the preferences of elderly nursing home residents when presented with an occupationally embedded exercise versus a rote exercise and addresses the methodological problems identified in similar past research.

Method. Fifty-two elderly nursing home residents were presented with a choice between an occupationally embedded exercise that involved unilateral dunking of a small, spongy ball into a basketball hoop and a rote exercise that involved moving the arm above the head in a simulation of the dunking exercise. Both exercises required flexion of the shoulder joint. Random assignment of the 52 subjects into one of four groups controlled for the order of the presentation of the exercises and the order of the choice statements.

Results. Sixty-nine percent of the subjects chose the occupationally embedded exercise. Analysis with the significance of a proportion statistic revealed a statistically significant difference ($z = 2.77, p$ (one-tailed) = .003).

Conclusion. Results were consistent with the hypothesis that elderly nursing home residents would tend to choose the occupationally embedded exercise. To further confirm this basic premise of occupational therapy, future studies that investigate therapeutic patterns of movement embedded in common occupations are recommended.

The essential role of the occupational therapist is to synthesize occupational forms that yield meaning, purpose, and therapeutic occupational performance on the part of a unique human being (Nelson & Stucky, 1992). When options are present in an occupational form, the patient has the opportunity to make meaningful choices. Choice making by the patient is important for at least three reasons: (a) it enhances the quality of performance, (b) it fosters the long-term development of an internal sense of self-efficacy, and (c) it is a characteristic of basic human dignity (LaMore & Nelson, 1993).

History supports the investigation of choice as an important area of inquiry for the profession of occupational therapy. Baldwin (1919) recommended that therapeutic occupation be in accordance with the patient's choice as long as the occupation is effective in meeting the therapeutic goals. Johnson (1920), one of the recognized founders of the occupational therapy profession, advocated that patients be given choices within their capabilities. Dunton (1931), another recognized founder of the profession, is well known for his prescription that the occupation be of interest to the patient. He also de-
scribed the close relationship between the concept of interest and the concept of choice (p. 113).

The advocacy for patients' choice making has continued in more recent occupational history. According to Hopkins and Tiffany (1988), the client's choice making may be vital in eliciting commitment to the occupation (p. 94). Kiellhofner (1992) wrote that the provision of options and the encouragement of choice making can assist the client in the development of an increased belief in personal effectiveness (pp. 164–165).

The effects of options and choice making on occupational performance can be thought of as one line of inquiry in the experimental analysis of occupation (Nelson, 1993). In this line of inquiry, the independent variable consists of two occupational forms that are contrasted to each other: one with options and one without options. The dependent variable could be self-reported levels of meaning or purpose, occupational performance, effects on subsequent occupational forms, or personal adaptations (self-change that would reveal itself experimentally in subsequent occupation). Published examples in this line of inquiry include Rice and Nelson (1988), LaMore and Nelson (1993), and Bakshi, Bhambhani, and Madill (1991).

Another line of inquiry in the experimental analysis of occupation involves the study of occupationally embedded exercise. This line of inquiry also has strong historical roots in the occupational therapy profession, as documented by Yuen, Nelson, Peterson, and Dickinson (1994). In this line of inquiry, the independent variable involves a comparison between a socioculturally recognizable occupational form and a rote exercise situation, both of which require largely the same pattern of movement (occupational performance). For example, Kircher (1984) compared jump roping with jumping in place in a routine way. There are several other examples within this line of inquiry (Bloch, Smith, & Nelson, 1989; Heck, 1988; King, 1993; Licht & Nelson, 1990; Miller & Nelson, 1987; Mullins, Nelson, & Smith, 1987; Riccio, Nelson, & Bush, 1990; Steinbeck, 1986; Thibodeaux & Ludwig, 1988; Yxler, Nelson, & Smith, 1989).

Mullins et al. (1987) attempted to integrate these two lines of inquiry. They focused on elderly nursing home residents' preferences when presented with two options: occupationally embedded exercise versus rote exercise. Both exercises elicited flexion at the shoulder joint. The occupationally embedded exercise involved making a ball hanging with a stencil and a stencil roller whereas the rote exercise consisted only of flexion at the shoulder joint. Seventeen of the 28 subjects chose the occupationally embedded exercise instead of the rote exercise. However, statistical analysis of these data did not indicate that this proportion was statistically significant ($z = 1.14, p = .13$ [one-tailed test for a directional hypothesis]).

Mullins et al. (1987) discussed the chances of a Type II error in their study. (A Type II error involves a failure to find statistical significance in a research study even though a true relationship exists among the variables in the real world.) A statistical rule is as follows: the smaller the sample size, the greater the likelihood of a Type II error. This rule is particularly true in a study involving a categorical variable, such as choice. A sample size of 28 subjects might be adequate if the dependent variable is continuous and if the effect size (experimental power) is large, but it will often result in a Type II error if the hypothesis is tested by the significance of a proportion statistic, as was done by Mullins et al. Other problems noted by Mullins et al. included the setting of the experiment, which was the residents' rooms as opposed to an environment that might have been more conducive to therapeutic exercise, and the possibility that the occupationally embedded exercise did not interest the men in the sample.

Our research was similar to that of Mullins et al. (1987) in terms of the population studied and general methodology. However, in a direct attempt to overcome the problems noted by Mullins et al., we designed our research with three major differences: the occupation in which the exercise was embedded, the location of the exercise, and the sample size.

The occupation we chose to study involved one-handed dunking of a small foam ball through a basketball hoop. We have two answers to questions that may arise as to the meaningfulness of such an occupation to elderly persons: one is theoretical and one is empirical. Theoretically, we maintain that most elderly men and women residing in nursing homes are very much like other persons; they know that exercise is good for them, but they do not like rote exercise (Mobily, 1982). Rote exercise is narrow in purpose, aloof or abstracted from the environment, and lacking in the sensory stimulation provided by most naturalistic occupation (Nelson & Peterson, 1989). In contrast, the dunking of a basketball is novel and potentially rich in fantasy. It naturally elicits a vigorous, playful response. We believe that people too often stereotype elderly persons in terms of what is supposed to be meaningful and that elderly persons often find fun in some things that others might see as age inappropriate or gender inappropriate. Empirically, our pilot study suggested that this occupation would be greeted by enthusiasm, but we did not assume that simulated basketball would be meaningful; we tested its meaningfulness. If subjects chose the occupationally embedded exercise instead of the rote exercise beyond levels that could be expected by chance alone, then the occupationally embedded exercise would be shown to have meaning to the subjects.

Another reason for choosing this occupation was that it involves a pattern of movement that is especially needed by elderly persons. The exercises most commonly recommended for elderly persons are movements emphasizing joint range of motion without substantial resistance (Herr & Weakland, 1988; Wear, 1984). These types...
of exercises increase the range of motion at a specific joint, place the least amount of stress on the body, and enable the patient to use functional reach patterns. These principles are particularly relevant to shoulder flexion, a common site of osteoarthritis and limited range of motion in elderly persons (Herr & Weakland, 1988).

In summary, this research project attempted to integrate two historically important lines of inquiry (occupationally embedded exercise and the effects of options and choice making on occupational performance) in the profession and to correct the problems noted in an earlier, similarly motivated study by Mullins et al. (1987). Our hypothesis was that a statistically significant proportion of elderly nursing home residents would choose the occupationally embedded exercise instead of the rote exercise.

Method
Subjects
The subjects of this study were 52 elderly nursing home residents (15 men and 37 women). The mean age was 82.5 years ($SD = 7.0$), and the range was 64 to 95 years. The subjects were residents from one of three skilled nursing facilities in Ohio. (Twenty-three subjects, 17 subjects, and 12 subjects were recruited from the three facilities, respectively.) The activities director of each facility identified potential subjects on the basis of their abilities to understand and follow directions, to make a choice, and to raise and straighten the arm so that the hand is over the head. Potential subjects were asked to provide informed consent on the approved institutional review board form.

Instruments
The Parachek Geriatric Rating Scale (King & Parachek, 1986) was compiled for each potential subject by the activities director; a minimum score of 25 of 50 possible points was required. Persons with a score of 25 or more are responsive, able to interact to some degree, and participate in their own care. In past research, the cutoff point of 25 has been an effective way to exclude subjects who were unable to participate in the research in a meaningful way (DeKuiper, Nelson, & White, 1993; Yoder et al., 1989). The mean Parachek score for the 52 subjects in the final sample was 43.9 ($SD = 5.2$).

The exercise apparatus used for the occupationally embedded exercise was the Fisher-Price basketball apparatus, copyright 1988, U. S. Pat. No. 4,315,185, which consists of a stable base, a hoop, and a pole that can be adjusted for persons of different heights (see Figure 1).

Figure 1. The basketball apparatus is adjustable for the quality of the subject's reach.

The ball that was used was a small, soft, spongy foam ball that can be held in one hand.

Procedure
The order of presentation of the exercises and the order of choice statements (exercise choices offered to the subjects) were counterbalanced to ensure that the results were not due to sequencing. Each subject was randomly assigned to one of four groups; each group consisted of 13 subjects. Counterbalancing was done as follows:

- Group 1 The rote exercise was practiced before the occupationally embedded exercise was prac-
After demonstrating also, demonstration were given in a parallel way. During the counting the repetitions aloud and gave the ball back to the subject.

The rote exercise involved the same movement pattern without grasping the ball. The instructions and a demonstration were given in a parallel way. During the 10 repetitions, the assistant exercised with the subject while counting the repetitions aloud.

After the two exercises, the assistant read the choice statement and demonstrated each type of exercise once. The following is the choice statement read when the rote exercise was stated first:

We have just done two exercises. Now I would like you to choose which was you would like to choose exercise during your 3-minute exercise period. Would you like to exercise by moving your arm like this or exercise by dunking the basketball into the hoop?

The choice statement read when the occupationally embedded exercise was stated first was identical except for reversal of the phrases "by moving your arm like this" and "by dunking the basketball into the hoop."

If a subject did not immediately make a choice, the assistant asked the subject if the instructions were clear and answered any questions. The assistant reread the choice statement if the subject asked. The assistant and the first author independently recorded whether the patient chose the occupationally embedded exercise or the rote exercise. Independent agreement between the two observers was perfect. For descriptive purposes only, the researcher also recorded the number of exercise repetitions performed by each subject.

Results

Data were analyzed with the significance of a proportion statistic for a one-tailed test to calculate a z score (Bruning & Kintz, 1977). Thirty-six of the 52 subjects (12 men and 24 women) chose the occupationally embedded exercise instead of the rote exercise. Analysis of these data showed that this proportion was statistically significant (z = 2.77, p (one-tailed) = .003). Those who chose the occupationally embedded exercise engaged in a mean of 21.86 repetitions (SD = 17.67), and those who chose the rote exercise engaged in a mean of 9.0 repetitions (SD = 4.16). The design of the study does not permit causal conclusions to be made about the number of repetitions because the comparison followed subject choice, not random assignment.

Discussion

In this study, a statistically significant number of elderly nursing home residents chose an occupationally embedded exercise instead of a rote exercise. Our interpretation of this finding is that subjects saw the occupationally embedded exercise as a novel yet recognizable sports simulation that provided feedback through the manipulation of objects. We also think they saw it as fun.

In quantitative research, procedures must be standardized for all subjects. Clinically, however, occupational therapists must consider the fact that each patient has a unique developmental structure. If the occupational therapist is committed to and prepared to synthesize different occupational forms, the patient will be given an opportunity to choose the one that is most meaningful. By providing options and encouraging choice, the therapist draws out increased levels of purpose and occupational performance on the patient's part. The challenge to today's clinician is to encourage meaningful, purposeful occupation while coping with increasing caseloads and institutional pressures.

The present study is also important for methodological reasons in advancing the experimental analysis of occupation. This study provides a model of how to reduce the possible existence of a Type II error like Mullins et al. (1987), there are many other occupational therapy
research projects that did not achieve statistical significance but that deserve follow-up studies. Mullins et al. reported that 60% of their subjects chose the occupation-ally embedded exercise. In the present study, 69% of the subjects chose the occupationally embedded exercise. According to Cohen (1988), a proportion of 60% is a slight-to-medium effect, whereas a proportion of 69% is a medium-to-large effect. Another contributor to the difference between the Mullins et al. and the present study was sample size: 28 in the former study and 52 in this study. The net effect on the power of the experiment is striking. Cohen’s (1988) statistical power analysis revealed that the power was .29 in Mullins et al. study and .90 in the present study. In other words, the likelihood of a Type II error was 71% in the Mullins et al. study.

Our recommendation to promote knowledge in occupational therapy is as follows: (a) failure to achieve statistically significant levels should be expected in new areas of inquiry where it is difficult or impossible to predict effect sizes; (b) these early studies in new areas should be published as long as there are reasonably good controls against Type I error (the probability of a falsely significant result); (c) others should be encouraged to conduct follow-up studies designed to enhance the power of the project; and (d) these follow-up studies and replications should be published until the principle under examination is fully understood across occupational forms, across dependent variables, and across populations. As a profession, there currently is not a single principle that is adequately understood from an experimental viewpoint.

There are many research questions that could follow up on the present study. Will nursing home residents choose an occupationally embedded exercise that consists of an occupation of daily living versus a rote exercise that facilitates the same movement pattern? Will they prefer to participate in occupationally embedded exercises that involve leisure occupations as opposed to daily living occupations?

It is also possible to study the choices that patients make between an occupationally embedded exercise, a rote exercise, and an imagery-based exercise. For example, do nursing home residents prefer to paint with horizontal strokes, to exercise with patterns of abduction and adduction, or to imagine that they are painting? Another approach would be to replicate the current study with another clinical population who need shoulder exercise.

An interesting feature of this study is that the occupationally embedded exercise that was chosen might be considered an occupation for men or young people. However, 65% of the elderly female subjects chose to dunk a basketball. Sociocultural stereotypes applied to occupational forms should be viewed with skepticism.

The use of purposeful occupation as a method to enhance meaning and purpose has been the core of the occupational therapy profession since its inception. Our recommendation to occupational therapists is to synthesize various occupational forms to ensure that the patient has an occupational choice.

Acknowledgments
We thank Patti Redella for research assistance and Ann Ryan, Social Services Director at Edgewood Nursing Home in Port Clinton, Ohio. We also thank Lisa Barrett, Activities Director at Riverview Nursing Home in Oak Harbor, Ohio, and Becky Warnock, Activities Director at Portage Valley Retirement Village in Pemberville, Ohio, for helping to screen potential subjects.

References


versus single-purpose activity in terms of duration on task, exertion level, and affect. *Occupational Therapy in Mental Health*, 7, 55–67.


