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IN-HOME ENERGY EDUCATION FOR ELDERLY AND LIMITED-INCOME HOUSEHOLDS

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Abstract

This study was designed to evaluate the impact of the Energy Education Program (EEP) on energy-conservation and energy-related behaviors among elderly and limited-income individuals in Georgia. Data were collected before and after the home visits of an energy-education counselor. The visits appeared to influence energy-related dwelling and behavioral changes. Dwelling changes correlated highly with three factors: 1) home visits by the energy counselor, 2) desire to keep warmer in the winter or cooler in the summer, and 3) the desire to reduce energy bills. The influence of promotions on television, radio, or newspapers was not correlated with changes. Of participants who had wasteful energy-consumption behaviors at the first summer visit, 61 percent showed improvement at the second visit. Among the reasons given to make changes, 78 percent of the sample attributed their action to visits from the energy counselor.

Introduction

According to the 1980 Census, over 12 percent of the U.S. population aged 65 or older live below poverty level (Statistical Abstract of the U.S., 1988). In Georgia approximately 17 percent of the total population and over 14 percent of persons aged 65 or older live below poverty level (Bachtel, et al., 1988). Georgia ranks eighth among the states for the percentage of the population living below poverty level (Bachtel, Mandell, and Lee, 1988). Among urban blacks two out of five live below the poverty level. This compares to one in eight of the white population. Almost half of rural blacks live below the poverty level (Bachtel, et al., 1988).

Recognizing the special needs of this group, the Georgia Center for Continuing Education at the University of Georgia and the Governor's Office of Energy Resources designed a program to assist elderly and lower income families. The program, called the Energy Education Program (EEP), was staffed with 27 energy counselors with instructions to provide energy information to the specified clientele. The counselors all lived in the communities in which they worked and were representative of the clients in age, race, sex. The goal of the program was to reduce the energy consumption of the target groups while increasing their safety, health, and comfort.

Unlike other energy-conservation programs, the Energy Education Program was not designed to provide financial assistance for changes in the home. Instead, it focused on providing energy education and counseling to individuals on a one-to-one basis in their homes or in small group settings. The limited economic resources of the clientele partially restricted the type of energy-conservation techniques that could be imparted.

Limited income, however, was only one of many difficulties that complicated efforts to aid these target groups. Lack of transportation to a workshop was a common problem. Lack of involvement in programs due to health problems was also cited. Fear, mistrust,

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and the educational level of the clients presented barriers as well. The home visit, a unique feature in this kind of program in Georgia, was instrumental in overcoming these kinds of barriers. In addition, the home visits allowed the counselors to observe first-hand the conditions of each home and to suggest specific solutions to energy-related problems. For many elderly or limited-income individuals, the home visit provided the encouragement needed to make energy changes.

Objectives

This study was designed to evaluate the impact of the EEP on energy-conservation and energy-related behaviors of the target groups. A second objective was to improve the health, safety, and comfort of these individuals. Moreover, the program also demonstrates the importance of one-to-one, in-home counseling in reaching the target group.

Factors Affecting Energy Behaviors

Financial limitations. The identified target groups, elderly and limited-income households, are particularly affected by increases in energy costs. These groups lack the financial flexibility to accommodate rising prices. According to the Energy Conservation Digest (1983), some older people are being forced to forgo necessities in order to pay home-energy costs. The Project Energy Care Committee of the National Council of Senior Citizens (1980) estimated that one of four elderly, poor households spends more than 40 percent of their income on heating; some may spend as much as 50 percent.

Elderly people consume less energy than any other age group, yet spend a greater proportion of their income on energy consumption (Junk and Heikkinen, 1987). The propensity to invest in conservation measures is less among those with low incomes (Niemeyer and Morris, 1986). According to Dillman, Rosa, and Dillman (1983), the poor tend to cutback on comforts--lower room temperature, close off rooms, lower water heater settings, etc.--to conserve energy and money. The more affluent, however, invest in conservation measures such as adding home insulation, storm windows, or purchasing new energy-efficient appliances.

Conditions of housing. In addition to insufficient income, many elderly and limited-income people live in substandard or older housing. Residents of such housing may experience more heat- or cold-related problems. The age of the home may increase the amount of energy consumed because these homes need more energy repairs. Often people living in older homes do not have the financial resources to make the energy improvements needed (Junk, Jones, and Kessel, 1988). Consequently, the old, poorly insulated home means higher energy costs for the resident.

Education. Low-income, poorly educated renters are most in need of energy information and resources to make energy improvements. Poorly educated renters spend an average of 40 cents more per square foot for energy than home owners (Junk, et al., 1988). As education levels increase, people consume significantly lower amounts of home energy (Junk, Junk, and Jones, 1987). Those with eight years or less education spent almost twice as much per square foot as those with graduate degrees. Further, elderly persons with higher education levels are more likely to participate in new learning experiences than those with less than a high school education (Heisel, Darkenwald, and Anderson, 1981). The higher the level of education of older persons, the more likely they are to participate in educational events (Junk, et al., 1988).

Motivating factors. There are several motivating factors which influence energy-conservation behaviors. These include: social conformity, conservation ethics, personal benefits, and economic benefits (Gmelch and Dillman, 1988).

"Social conformity" refers to the gamut of feelings between guilt for not conserving and peer approval for conserving. Conservation ethics involve conservation as a value in and of itself. In this view, reducing the actual amount of energy used in the home and preserving future energy resources is regarded as beneficial behavior. The personal-benefit factor involves the need to maintain or increase the value of the home and main-

tain personal comfort. Finally, the economic-benefit factor involves the desire to reduce energy costs and to avoid cutbacks on other items. In a recent study by Gmelch and Dillman (1988), respondents were asked to rank definite reasons for conserving energy. Less than 10 percent cited social conformity. Just over half listed conservation items, one in four listed personal benefits, and almost 60 percent ranked economic items as definite reasons to conserve.

Housing Behavior Model

There are several useful models that explain change in energy consumption in the home. Morris and Winter (1981) view housing adjustment based on a family-attitude-behavior model. From this perspective the family may be viewed as engaging in a dynamic process of evaluating its housing in terms of cultural and family norms. The desire to make behavioral adjustments is higher when the family experiences a deficit in housing satisfaction due to energy conditions.

An energy adaptation model by Gladhart and Roosa (1982) also includes a basis for understanding family energy-use through norms that serve as criteria for energy usage. In this model, individuals are viewed as monitoring their comfort, expenditures, and usage levels by comparing their current situation with cultural, family, and individual norms. When this comparison results in a discrepancy, changes in energy use are likely to follow.

Low satisfaction prompts the individual to consider a variety of changes in physical environment and in individual behaviors. Depending on the family resources and constraints, these attempts to adapt or make changes may or may not be successful. In the Gladhart-Roosa model, family members repeat this process until either the gap is eliminated or the family's perceived alternatives are exhausted. More specific to this discussion, failure to eliminate an energy-related gap may result in changed norms or in a chronic, individual or family, problem.

Several propositions for energy adaptation undertaken by families have been suggested by Gladhart and Roosa (1982):

1) Many norms for energy consumption are inherently contradictory and tend to produce conflict. Measures taken to reduce a comfort gap, for example, implies increased energy use. Measures taken to reduce a budget or usage gap, however, will normally imply less energy use.

2) Families most strongly committed to maintaining comfort through control of room temperature rather than dressing warmer or modifying space usage will be least able to meet budget gaps by making thermostat adjustments.

3) Families who lack economic or human resources to increase energy efficiency are more likely to feel alienated by the situation.

4) Persons with stronger norms for high winter and low summer room temperatures coupled with resource limitations will find it least easy to change to a more energy-efficient temperature setting.

5) The higher the desired winter temperature and the lower the income, the lower the flexibility of lifestyle.

6) The higher the knowledge level and the greater the learning skills of family members, the more likely conservation measures will be considered and attempted.

7) The greater the willingness of the family to change behavior patterns, the greater the adaptation of energy conservation attempts.

Based on the review of theory, the goals of the EEP were to increase year-round comfort in the home, encourage energy management, and to stretch the energy dollar. In-home counseling provides the link to educate and motivate by reinforcing social norms and conservation ethics, and by promoting the personal and economic benefits of energy conservation.

Changes in housing-related behaviors are accelerated by discomfort in the environment or pressure on family finances from high utility costs. In-home energy counseling helps the family decide among alternatives for solving energy problems. It also provides reinforcement as changes are actually made.

These propositions provide insight into the problems encountered by the families targeted by the EEP. Limited resources, education deficiencies, and personal feelings of alienation suggest that affecting change in a limited-income family requires more than education through group presentations. If a family feels alienated, it may avoid group functions. Hence the need for personalized, one-to-one contact to provide the encouragement and motivation necessary to make changes.

Method of Program Delivery

Different delivery methods were employed by the EEP to affect changes in client behavior. Because of its roots in social casework, community health, and related practice, case management was the first delivery method considered.

In the case-management model, service is provided to individuals on a case-by-case basis. The orientation is holistic and encompasses all aspects of the person, their situation, and environment (Maddox, 1987). In addition, it seeks to enhance client self-care and self-determination by involving the client in solving problems and making decisions. This method has been particularly successful with dependent populations such as the frail elderly, the disabled, and children (Maddox, 1987).

Another useful model is the social-systems method. This approach interprets the individuals' behavior within a social situation and suggests several strategies for communicating with and motivating older persons. Examples include showing respect, providing encouragement, and reminiscing (Keller and Hughston, 1981). The overall emphasis of a social-systems approach is on the growth and independence of older individuals.

The one-on-one educational approach was recommended by the U.S. Department of Agriculture handbook "Using Paraprofessionals to Deliver Education Programs." According to the handbook, the one-on-one teaching method is one of the most effective ways to reach low-income audiences. Individualized, in-home counseling facilitates learning because of the familiarity of the surroundings (U.S. Department of Agriculture, 1986). Moreover, this method of delivery provides information about the environment in which an individual lives.

Another successful program is the Expanded Foods and Nutrition Program (EFNP) as practiced by the extension home economist. In this program, home-economics professionals attempted to improve quality of life by addressing the social and material needs of individuals and families within and outside the home (Coleman and Barranti, 1989). This goal is accomplished by tailoring the training to the needs of the audience.

Rationale

The Energy Education Program was designed to meet the needs of limited-income groups and the elderly. The unique needs of these consumers were taken into account as was current theory on how to best affect changes in energy-consumption behaviors.

In 1982, a pilot study was conducted by the Georgia Center for Continuing Education and Office of Energy Resources to determine the most effective way to implement the goals of the EEP. The three systems utilized in the study were: 1) group presentations by Cooperative Extension Service agents (home economists) at Congregate Meal sites, 2) in-home sharing by Cooperative Extension Program assistants as a part of an existing program, and 3) one-on-one, in-home counseling by individuals involved as energy counselors for the sole purpose of sharing energy information.

Of these three systems, the one-on-one "energy visit" was shown the most effective. The reasons cited among those who made energy changes were primarily related to "someone showed me how."

The in-home, one-on-one method was selected for the energy-counseling program. The decision was based on a review of the case-management and social-systems approaches, the results of the pilot study, and on recommendations from the EFNP and the Department of Agriculture.

Methodology

Sample

A convenience sample of 675 participants was drawn by a random selection of 25 files from each of the 27 energy counselors. Omission of 126 incomplete files left a total sample of 549. All of the participants in the study were either elderly (58 percent were over the age of 65), or lower income individuals. Female participants were overrepresented (75 percent) as were blacks (63 percent) and divorced or widowed individuals (67 percent). Almost half of these individuals lived alone; the remainder lived with one or more persons.

Over two thirds of the participants were home owners in single-family dwellings, although mobile homes, public-housing units, and apartments were also represented. Almost three fourths of these homes had not been weatherized within the last five years. Dwelling problems affected seven of ten of the houses; lack of insulation was a problem in six of ten.

Procedure

Documenting needs. The design for this study was a simple test-treatment-retest quasi-experiment with two experimental groups, a summer group and a winter group. Because of limited resources, no control group was used. The quasi-experimental nature of the study limits the applicability of the results among other populations. Yet, the size of the sample and robust nature of the results are compelling evidence of the efficiency of the intervention.

The initial measurement was done at the beginning of the treatment. Twelve months elapsed between the initial measurement and the second visit. Data were collected by means of counselor inspections and structured interviews. Checklists were used to reduce the possibility of interviewer bias. Thermometer readings were taken in the home to determine whether heating and cooling settings were appropriate for energy conservation. Other data were gathered using observational techniques. Training supervisors accompanied interviewers to help insure reliability between raters.

In addition to demographic and other descriptive information, indices were constructed and used to measure dwelling problems, energy-conservation behaviors, safety- and health-related energy behaviors, and changes made to the home. Dwelling problems were measured by identical indices. Behaviors specific to winter and summer, however, were measured by similar, but not identical, checklists.

The kinds of dwelling problems recorded by the energy counselors included gaps around doors and windows, lack of insulation, holes or cracks in walls and floors, and an open crawl space under the house. Energy-conservation behaviors for the winter measure included regulation of room temperature, moderating water-heater temperature, and heating the home with the kitchen oven. Safety- and health-related behaviors for the winter category included such factors as fire-safety behaviors, proper diet, and clothing in and out of the home.

Implementing change. The EEP was intended to motivate rather than finance energy-conservation changes and behaviors for individuals on limited incomes. As a consequence, dwelling and behavioral changes focused on methods which would be most effective in saving energy at minimal cost. The winter indices for energy-saving changes to the dwelling included such things as caulking around windows, use of plastic storm windows, weatherstripping, and general repairs.

Energy-conservation behaviors for the summer measure included such factors as regulation of room temperature, moderating water-heater temperature, and use of attic fans during appropriate times of the day. Summer behaviors included timing of chores, proper clothing in and out of the home, use of windows, and fans. Summer changes included insulation of the ceiling, use of awnings, window shades, planting grass or shrubs, and other changes. Dwelling changes were measured by indices for winter and summer. Participants also were asked what influenced their decision to make needed changes. Was it the desire to keep cooler or warmer, influence of the energy counselor, media exposure, or someone demonstrating how to make changes?

Analysis

Frequencies were initially run on the sample to construct a description of population characteristics. Pearson correlations were calculated to indicate relations between selected variables. Finally, paired-sample t-tests were performed to compare mean scores on some of the indices.

Results

The results of the analysis are consistent with the hypothesis. The home visits by energy counselors proved effective in motivating elderly and low-income individuals to modify their homes and behaviors in order to lower energy costs and increase comfort in the home.

As presented in Table 3, the correlation between existing dwelling problems (problems at Time 1) and changes in the summer is low or insignificant (r=0.088). This indicates that the presence of noticeable dwelling problems was not enough to motivate householders to make changes. Similarly, correlations between media influences on television, radio, and in newspapers and dwelling changes were also low (r=0.017). There were also low correlations between existing dwelling patterns and changes made in the winter (r=0.008), and between dwelling changes and media influence (r=0.061). These relationships are shown in Table 2.

In contrast, correlations were high between dwelling changes in the summer and three factors: 1) the desire to keep cooler (r=0.651), 2) the desire to lower energy costs (r=0.595), and 3) the influence of home visits (r=0.651). The influence of home visits also correlated highly with the desire to keep cooler (r=0.804) and the desire to lower energy costs (r=0.709).

For the winter group (Table 2), dwelling change correlated highly with the desire to keep warmer (r=0.671), and the influence of home visits by the energy counselor (r=0.698). Similarly, the influence of home visits correlated highly with the desire to keep warmer (r=0.727) and the desire to lower energy costs (r=0.753).

A more detailed summary of reasons that were cited for change is shown in Table 1. It is noteworthy that visits from the energy counselor, keeping warm, and saving money were significantly high reasons for change.

Table 1. Reasons cited for change (N=549).

Energy Improvements for winter group	Number who made changes	Keep warm	Save money	Shown how	Media info	Visit by counselor
Caulking	47	30	39	9	0	46
Glazing	18	14	16	4	0	18
Plastic	30	27	27	13	0	29
General repairs	18	13	16	7	0	16
Air guards	68	60	61	33	3	63
Weatherstripping	37	23	35	8	0	36

Table 2. Correlation matrix of winter groups--selected variables (N=549).

Variables	Problems at Time 1	Winter structural changes	Change in energy conserv'n	Change in safety/health behaviors	Influence of media	Someone showed me how	Desire to keep warmer	Desire to save money	Energy counselor visit
Problems at time1	1.000								
Winter structural changes	.008	1.000							
Change in energy conserv'n	-.105	.112	1.000						
Change in safety/health behaviors	.015	.176	.558	1.000					
Influence of media	.061	.001	.123	.115	1.000				
Someone showed me how	-.008	.331	.447	.344	.228	1.000			
Desire to keep warmer	-.114	.671	.245	.193	.038	.418	1.000		
Desire to save money	-.110	.691	.293	.305	.070	.450	.783	1.000	
Energy counselor visit	-.073	.698	.279	.275	-.059	.432	.727	.753	1.000

Table 3. Correlation matrix of summer groups--selected variables (N=549).

Variables	Problems at Time 1	Summer structural changes	Change in energy conserv'n	Change in safety/health behaviors	Influence of media	Someone showed me how	Desire to keep cooler	Desire to save money	Energy counselor visit
Problems at time1	1.000								
Summer structural changes	.088	1.000							
Change in energy conserv'n	.094	.362	1.000						
Change in safety/health behaviors	.093	.199	.614	1.000					
Influence of media	.063	.017	-.026	-.045	1.000				
Someone showed me how	.140	.169	.195	.291	-.021	1.000			
Desire to keep cooler	.259	.690	.345	.272	.082	.410	1.000		
Desire to save money	.283	.595	.222	.114	.028	.283	.788	1.000	
Energy counselor visit	.269	.651	.346	.286	.012	.389	.804	.709	1.000

Problems that were noted by the energy counselor were brought to the attention of the client. Table1 reflects only those clients who made changes for the five selected reasons. Other reasons cited for change are not shown on this table. As a consequence, the percentage of 549 participants seems relatively low. If other reasons for change during the winter were included the percentage would have been higher. Reasons for change during the summer are not presented in a table due to insufficient data.

The bar charts in Figure 1-a and l-b illustrate the distribution of reasons attributed by the participants for making changes in their behaviors. Of the 144 subjects who had unhealthy and unsafe winter energy behaviors at the first winter visit, over half showed improvement at the second visit. Of the reasons offered for the changes, two thirds attributed their action to visits from the energy counselors.

Summer subjects showed similar results. Over half showed improvement at the second visit; over three fourths attributed their action to visits from energy counselors. Energy conservation behaviors showed similar improvements. Half of the winter subjects and over 60 percent of summer subjects showed improvement at the second visit. Two thirds of the winter subjects attributed their change in behavior to the visits of the energy counselors. Almost 80 percent of the summer subjects showed improvement.

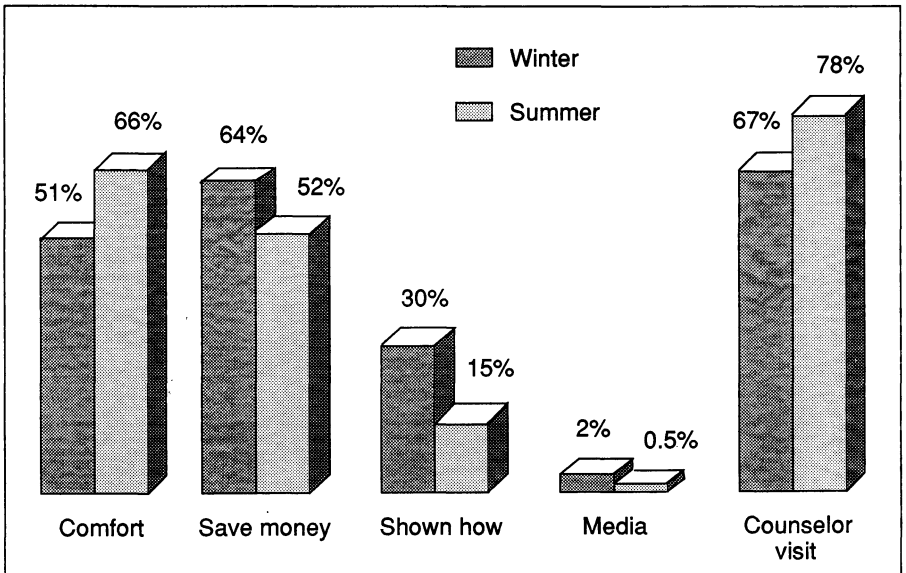

Figure 1-a. Percentage of subjects attributing reasons for change in energy conservation behaviors.

Paired-sample t-tests were conducted on energy-conservation and safety-and-health indices at time 1 and time 2 for both summer and winter groups. The mean score for unsafe energy-related behaviors among the summer group was lower at the second visit than at the initial visit ($t=8.86$, $p<.0001$). This was true also for the winter group ($t=7.15$, $p<.0001$). The difference in mean scores is considerable. They are shown in Figure 2. The mean score for wasteful, energy-related behavior among the summer group was also lower at the second visit than at the initial visit ($t=9.94$, $p<.0001$). This was the case

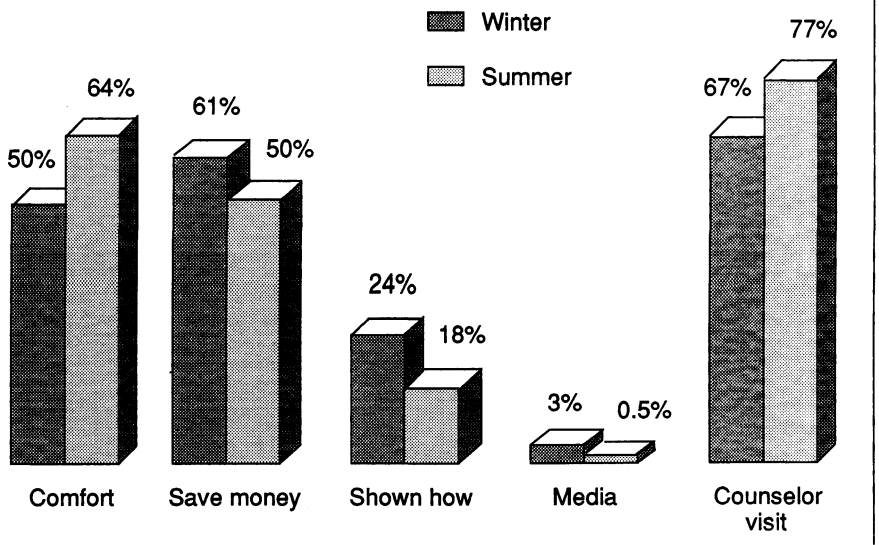

Figure 1-b. Percentage of subjects attributing reasons for change in safety and health-related behaviors.

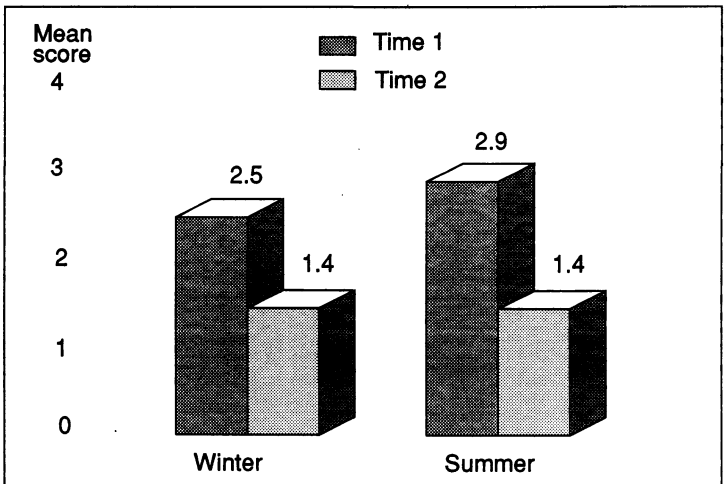

Figure 2. Differences in mean scores for unsafe or unhealthy energy practices. Winter and summer samples.

for the winter group (t=6.1, p<.0001). The difference in the means for wasteful, energy-related behaviors is illustrated in Figure 3. In both winter and summer groups, energy-conservation behaviors and energy-related safety and health behaviors were significantly improved after treatment.

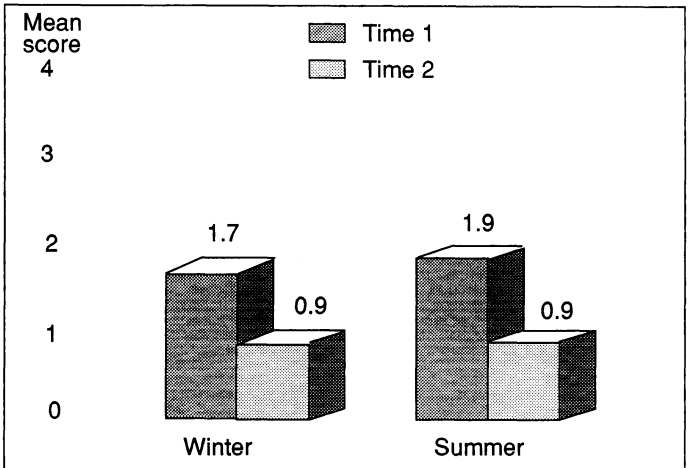

Figure 3. Differences in mean scores for wasteful energy practices. Winter and summer samples.

Discussion

Although this pilot study did not include a control group, the results indicate the effectiveness of home visits in motivating measurable behavioral change in elderly and low-income energy consumers. Dwelling changes were not correlated with the mere presence of problems nor with the influence of the media. Rather, they were correlated with home visits, the desire to keep warmer or cooler, and the desire to lower energy expenditures.

The EEP utilized propositions from the model suggested by Gladhart and Roosa (1982). As noted, the propositions demonstrated the contradictions that exist within norms for energy consumption. The EEP effort uncoupled the oppositional aspects of the norms by emphasizing changes in behavior, use of space, and low-cost dwelling improvements. For example, individuals were shown how to increase their personal comfort by layering clothes or wearing a hat. Similarly, they were shown how closing off unused rooms or applying weatherstripping can achieve increased comfort while saving money.

These behaviors reinforce the family attitude and behavior model of housing adjustment (Gladhart and Roosa, 1982). Initially, behavioral changes or adjustments are made because of a deficit in housing satisfaction due to energy conditions. The personal intervention of the energy counselor not only influences but accelerates change in family norms.

When a family utilized or committed themselves to a suggested conservation method and noticed a difference in their comfort, it was likely that more changes would follow. Thus, as a family's knowledge of energy conservation increased, more conservation measures were considered and attempted. Most importantly, the personal nature of the intervention helped overcome feelings of helplessness or alienation among the limited-income individuals. This advent increased their willingness to change and their perception that change was possible and beneficial.

Conclusion

Successfully reaching people and promoting positive energy behaviors requires more than sharing information through brochures, lectures, and the media. This study demonstrates the need for individualized, one-on-one counseling to affect change. Encouragement helps motivate people to make energy changes. Besides saving money, these changes benefit in terms of comfort, safety, and health.

A more detailed study should be conducted to further assess the effect of energy changes. Specifically, such a study should examine the patterns of energy usage among the elderly and limited-income population before and after visits by an energy counselor. In addition, the study should evaluate the return on investment of the counseling program. How much does it cost to make visits to that home?

Even more important than the actual dollar amounts saved may be the improvement in the quality of life for the individuals reached by an energy-education program. Is the investment worth the return in energy saved, increased comfort, and the elimination of safety hazards in the homes? A major project to be undertaken in future studies would be the development of a procedure to measure comfort and the impact on individual behavioral change. Such a procedure would help to establish the effectiveness of in-home energy-education programs.

The energy-counselor program described in this study is costly to operate. A good option is to train volunteers to do energy counseling using training packages or materials developed from this study.

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