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ENERGY-PROBLEM BELIEFS AND CONSERVATION BEHAVIORS: FEMALE-HEADED AND JOINTLY-HEADED RENTER HOUSEHOLDS DIFFER

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ABSTRACT

Based on Niemeyer and Morris's (1986) model of energy adjustment, possible differences between female-headed and jointly-headed households' energy-problem beliefs and home energy-conservation behaviors are determined. Female-headed households report less belief in the seriousness of the energy problem in the United States when controlled for age, education, and income than do jointly-headed renter households. Female-headed households also report fewer home energy-conservation behaviors when controlled for age, number of children, and type of household than do jointly-headed households. Further research into the differences between female-headed and jointly-headed households would aid educators and policy makers in targeting the differing needs of these two types of renter households.

INTRODUCTION

Although many jointly-headed households (households in which both husband and wife are present) are renters, female-headed households are more likely to rent than are jointly-headed households (Hanna and Lindamood, 1979). Families headed by females have lower incomes than do families headed by males (U.S. Bureau of Census, 1979). Female household heads, on average, have lower educational levels than do male household heads and are less likely to be members of the work force (Burgess, 1980; U.S. Bureau of Census, 1973). Winter and Morris (1982) study the differences and similarities in a subset of norms, preferences, and actual housing conditions between female-headed households and jointly-headed households. Generalizing from that finding, there may be differences in energy-problem beliefs and conservation behaviors related to type of household, even if the two types of households are both renters.

The purpose of this study is to further the understanding of energy-problem beliefs and energy-conservation behaviors of two types of renter households. The objectives are to assess the differences between female-headed and jointly-headed renter households' energy-problem beliefs and energy-conservation behaviors when controlled for resource constraints: age, education, income and number of children.

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THEORETICAL MODEL

Niemeyer and Morris's Model of Energy Adjustment

Niemeyer and Morris (1986) propose that, if family housing fails to meet energy-efficiency norms, dissatisfaction occurs. They state that when the dissatisfaction becomes great enough, the propensity to engage in energy-saving behavior occurs. They test a model of energy adjustment by looking at resource constraints (those constraints that restrict the household's ability to engage in adjustment behavior) and predisposition constraints (those constraints that restrict the household's skill and motivation to engage in adjustment behavior) and their relationships with belief in the energy problem, energy conditions of a home, satisfaction with those energy conditions, and the propensity for energy conservation. Niemeyer and Morris find that predisposition constraints are the key determinant of belief in the energy problem. They conclude that programs that depend upon changing the attitudinal predispositions of members of society would not be recommended based on the results. According to Niemeyer and Morris, resource constraints, as a group, are the key explanation to the propensity for energy conservation. They conclude that programs that remove the effects of resource constraints to energy-saving behavior should be recommended.

Proposed Model

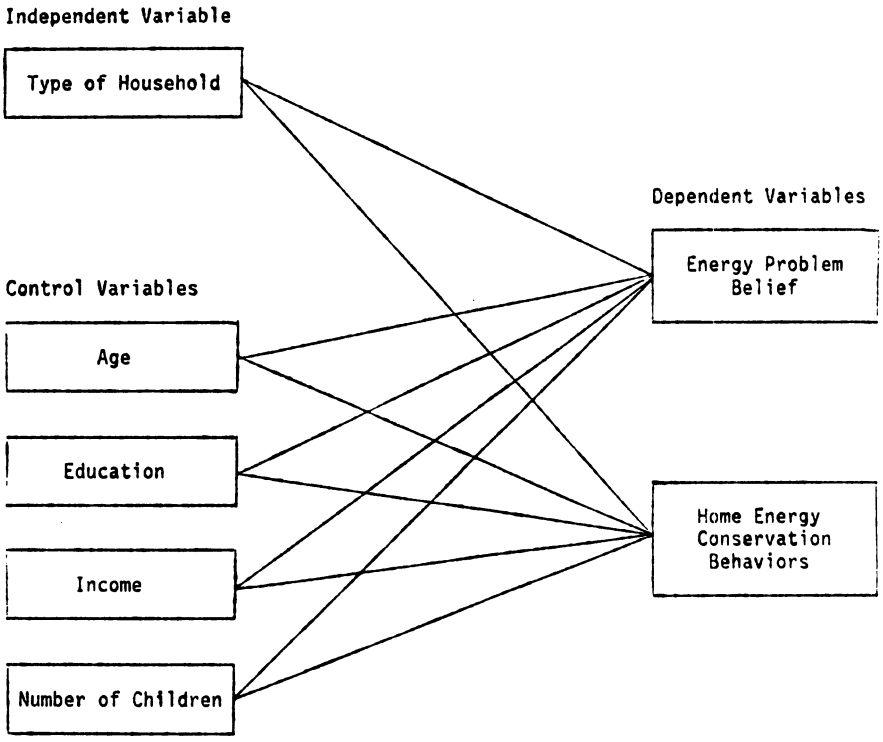
Based on Niemeyer and Morris's (1986) tested model, the proposed model (see Figure 1) depicts possible differences, when controlled for resource constraints, between two types of renter households' energy-problem beliefs and home energy-conservation behaviors. The resource constraints are confined to four variables: age, education, income, and number of children. These control variables may be working alone or together with the independent variable to create differences between types of households with regard to the dependent variables.

METHODS

The data for this study were taken from the data base, "Consequences of Energy-Conservation Policies for Western Region Households," obtained by the Western Regional Agricultural Experiment Station Technical Committee (W-159). Data from the 1983 western states sample were used for analysis. This was the second phase of a study that included data collection by mail surveys in 1981 and 1983. Dillman's (1978) *Total Design Method* (TDM) was the procedure used for the data collection.

The 1983 sample consisted of two parts. In 1981, a stratified random sample was selected by mailing an equal number of questionnaires to potential respondents in rural and urban areas within ten western states and Pennsylvania. Participants in the 1981 data base were included in 1983 along with a new sample. The 1983 new sample was selected by the same method as the 1981 sample within Pennsylvania and eight western states. The new sample included Arizona, Colorado, Idaho, Nevada, Oregon, Pennsylvania, Utah, Washington, and Wyoming. Unweighted data were used for the descriptive statistics. Weighted data were used for null hypothesis testing. The data were weighted to represent the true rural/urban proportions within each state and each state's population proportion within the eight western states. (Details on the particular uses can be found in *Consequences of energy conservation policies for western region households* (1986).

Figure 1. Proposed Model



Hypotheses

The null hypotheses were:

1. Female-headed and jointly-headed renter households do not differ in their mean belief scores about the seriousness of the U.S. energy problem when controlled for possible correlated resource constraints.

2. Female-headed and jointly-headed renter households do not differ in the mean number of home energy-conservation behaviors when controlled for possible correlated resource constraints.

Statistical Analysis

The categorical control and dependent variables were indexed to be continuous variables. These included age, number of children, and number of conservation behaviors. Pearson rank-order correlations between control variables and independent and dependent variables were completed in order to determine the strength of the relationship between each pair of variables (Nie, Hull, Jenkins, Steinbrenner, and Bent, 1975). Control variables not correlated with a dependent variable were dropped in the analysis of covariance of that dependent variable. Thus, two univariate analyses of covariance, each with one dependent variable, were completed. Multiple Classification Analysis was completed to determine mean scores.

Measurements of variables. The variables used in this study with their measurements are summarized in Table 1.

Preliminary Analysis. Jointly-headed households were tested for the differences that might occur between female and male respondents. Two null hypotheses for the differences between female respondents and male respondents within the category of jointly-headed households were tested for differences in belief in the energy problem and home energy-conservation behaviors using weighted data. This was completed before testing for the differences between female-headed and jointly-headed households' belief in energy problems and home energy-conservation behaviors.

Hypothesis A. Female and male respondents within jointly-headed households do not differ in their mean belief scores about the seriousness of the U. S. energy problem, when controlled for possible correlated resource constraints.

Hypothesis B. Female and male respondents within jointly-headed households do not differ in the mean number of home energy-conservation behaviors, when controlled for possible correlated resource constraints.

Pearson Correlations revealed that all control variables were correlated at the $p < 0.05$ level with the first dependent variable, belief in the energy problem, and were used in the analysis of covariance. Two control variables, age and number of children, were correlated ($p < 0.05$) with the second dependent variable, home energy-conservation behaviors, and were used in the analysis of covariance.

Table 1. Variables and measurements used in analysis

Variable	Measurement
Type of household	Marital status and sex of respondent
Female-headed households	Divorced, widowed, separated, or never married and female
Jointly-headed households	Married and female or male
Age	Age of respondent: 1=25 or less, 2=25-34, 3=35-44, 4=45-54, 5=55-64, 6=65-74, 7=75 or older
Education	Educational level of respondent: 1=0-8 grades, 2=some high school, 3=high school graduate, 4=trade school, 5=some college, 6=college graduate, 7=some graduate work, 8=a graduate degree
Income	Total family income before taxes: 1=less than $5000, 2=$5000-9999, 3=$10000-$14999, 4=$15000-$19999 5=$20000-$24999, 6=$25000-$29999 7=$30000-$39999, 8=$40000-$49999 9= $50000 or more
Number of children	Total number of children who live in the household: 0=0, 1=1, 2=2, 3=3, 4=4 or more
Belief in energy problem	1=Not a serious problem, 2=A somewhat serious problem, 3=A serious problem, 4=A very serious problem
Home energy-conservation behaviors	Number "done now"= 0-6; behaviors include: close off some rooms; have water heater set to 120°F; in winter set thermostat at 65°F or lower, in summer, set thermostat at 78°F or higher; change use of rooms to take advantage of sun-warmed or shaded areas; and open and close window coverings to take advantage of sun and temperature differences

Null hypotheses A and B were tested using the analysis of covariance statistical test, with the level of significance set a $p < 0.05$. Using the analysis of covariance test, null hypotheses A and B were not rejected at the $p < 0.05$ significance level. There was no significant difference between female and male respondents' mean belief scores about the seriousness of the problem when tested by type of household ($p=0.12$) or when controlled for age ($p=0.14$), education ($p=0.06$), income ($p=0.34$), and number of children ($p=0.40$). There was no significant difference between female and male respondents' mean number of

home energy-conservation behaviors when tested by type of household ($p=0.08$) or when controlled for age ($p=0.09$) and number of children ($p=0.82$). Because both null hypotheses A and B were not rejected at the $p < 0.05$ level, null hypotheses 1 and 2 were tested.

FINDINGS

Description of the Sample

The sample consists of 666 renters from eight western states, with nearly two-thirds (64 percent) of the households being jointly-headed. The mean ages of the respondents in female-headed and jointly-headed households are 43.3 and 39.8 years, respectively. The educational level of both female-headed and jointly-headed households is evenly distributed, with the mode and median in the "some college" category. The median income of female-headed households falls in the $10,000-$15,000 range compared to the median for jointly-headed households, which is in the $20,000-$25,000 range. About one-third (32 percent) of female-headed households have children, while over half (54 percent) of jointly-headed households have children.

Hypotheses Findings

Two null hypotheses are used to test female-headed households' and jointly-headed households' 1) beliefs about the U.S. energy problem and 2) frequency of home energy-conservation behaviors. Pearson rank order correlations were completed prior to testing the hypotheses (see Table 2). All control variables are correlated at the $p < 0.05$ level with the first dependent variable, belief in the energy problem, and are used in the analysis of covariance. Two control variables, age and number of children, are correlated ($p < 0.05$) with the second dependent variable, home energy-conservation behaviors. They are used in the analysis of covariance. Age has a negative correlation and number of children has a positive correlation. Educational level and household income are not correlated ($p > 0.05$) with home energy-conservation behaviors. They were dropped before the analysis of covariance.

The female-headed households and the jointly-headed households differ in their energy-problem belief mean scores ($M=3.4$ and 3.3, respectively) when controlled for age ($p=0.03$), education ($p=0.003$), and income ($p=0.046$) (see Table 3). The independent variable (type of household ($p=0.35$)) and number of children ($p=0.89$) do not explain the difference in energy-problem beliefs. In other words, female-headed renter households, when controlled for age, education, and income, report significantly less belief in the energy problem than do jointly-headed households.

Female-headed households and jointly-headed households differ in the mean number of home energy-conservation behaviors reported ($M = 2.78$ and 3.32, respectively) when controlled for age ($p=0.00$) and number of children ($p=0.02$) (see Table 4). The independent variable, type of household ($p=0.00$), also helps to

Table 2. Pearson Correlation coefficients of the dependent variableson the control variables

Dependent Variables	Control Variables				Independent Variable
	Age	Education	Income	Number of children	Type of houseold
Belief in energy problem	0.12*	0.14*	0.07*	0.07*	0.06
Home energy-conservation behaviors	0.17*	0.03*	0.05*	0.10*	-0.18*

* = p <0.05

Table 3. Belief in energy problems by female-headed households and jointly-headed households[a]

Source	df	ss	ms	F	F prob.
Covariates	4	29.08	7.27	3.49	0.008
Age	1	10.38	10.38	4.99	0.026
Education	1	18.28	18.28	8.80	0.003
Income	1	8.29	8.29	3.99	0.046
Children	1	0.04	0.04	0.02	0.885
Main effects[b]	1	1.82	1.82	0.88	0.350
Explained	5	30.90	6.18	2.97	0.012
Residual	717	1491.25	2.08		
Total	722	1522.15			

MCA	n	Adjusted Mean
Type of Household		
Female-headed	296	3.35
Jointly-headed	427	3.25
Total	723	

a. Analysis of covariance

b. Independent variable, female-headed and jointly-headed

explain the difference in home energy-conservation behaviors. In other words, female-headed renter households, when controlled for age, number of children, and type of household, report significantly fewer home energy-conservation behaviors than do jointly-headed renter households.

Table 4. Home energy-conservation behaviors by female-headed households and jointly-headed households[a]

Source	df	ss	ms	F	F prob.
Covariates	2	79.36	39.68	15.06	0.00
Age	1	46.28	46.28	17.56	0.00
Children	1	15.54	14.54	5.52	0.02
Main Effects[b]	1	44.93	44.93	17.05	0.00
Explained	3	124.29	41.43	15.72	0.00
Residual	719	1893.56	2.64		
Total	722	2017.85	2.80		

MCA	n	Adjusted Mean
Type of Household		
Female-headed	296	2.78
Jointly-headed	427	3.32
Total	723	

a. Analysis of covariance

b. Independent variable, female-headed and jointly-headed

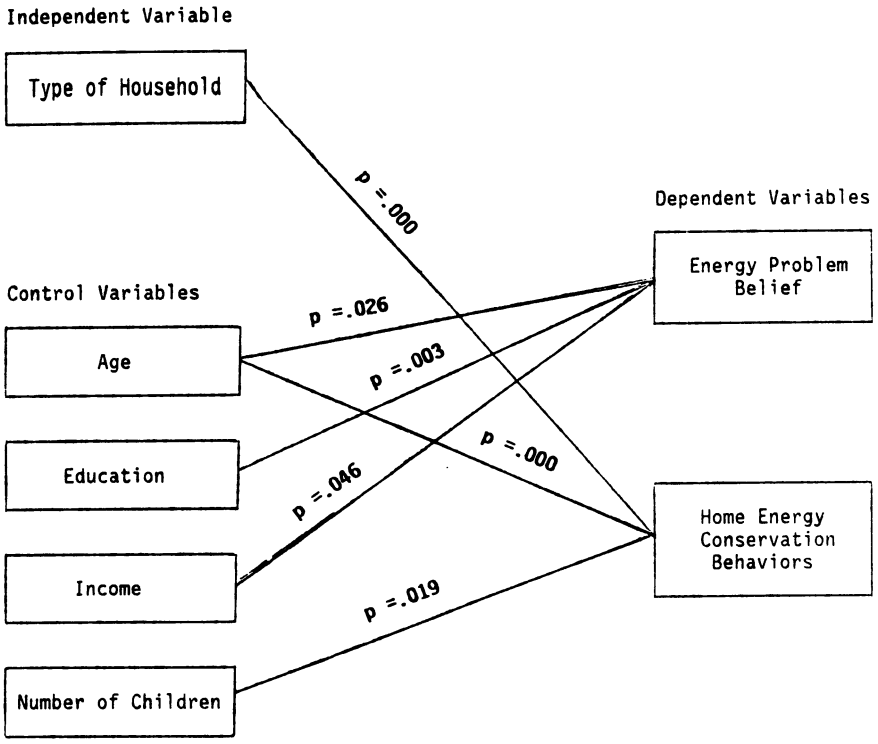
Discussion of Findings

The tested model supports differences between the two types of renter households' energy-problem beliefs and home energy-conservation behaviors when controlled for resource constraints (see Figure 2). Energy-problem belief mean scores differ between female-headed households and jointly-headed households that are controlled for age, education, and income (see Figure 2). The mean number of home energy-conservation behaviors reported differs between female-headed and jointly-headed households when controlled for age, number of children, and type of household. The findings of this study support Niemeyer and Morris's (1986) contention that programs that remove the effect of resource constraints on energy-saving behavior should be recommended. The energy beliefs of the respondents in this study are also affected by resource constraints, as is found in Niemeyer and Morris. Although they find that predisposition constraints are the key determinant of beliefs, predisposition constraints are not considered in this study because the data is not available.

Energy problem belief. Olsen (1981) suggests that it is necessary to understand beliefs about the energy situation before being able to understand energy-conserving behavior. In the study, the variables that make a difference in energy-problem belief mean scores between the two types of households are age, education, and income.

According to Johnson-Carroll (1986), the age of a consumer has a definite impact on the consumer's attitudes and beliefs toward energy conservation. She

Figure 2. Tested Model



also reports that the age of a consumer also has an impact on the amount of energy consumed in a household. While the findings of this study reveal a difference in belief mean scores based on age, further analyses is needed to identify the relationship between age and beliefs about the energy situation.

Olsen (1981) asserts that the educational level of a consumer is the best single predictor of belief in the seriousness of the energy crisis. According to Barnaby and Reizenstein (1975), educational level is positively associated with attitudes toward energy conservation. This study finds that the level of education makes a difference in energy-problem belief mean scores between female-headed and jointly-headed households.

According to Newman and Day (1975), income is the strongest single determinant of energy consumption and one of the best predictors of willingness to practice energy conservation. The findings of this study show a difference based on income, but further analysis is needed to identify the exact income ranges that differ from each other. Therefore, the influence of age, education, and income on the energy-problem beliefs of female-headed and jointly-headed renter households needs further research to determine the type of relationships between the levels of the control variables and belief.

Energy-conservation behaviors. While improvement of home-energy efficiency may result from making structural energy-conserving adjustments, home energy may also be conserved through behavior modification resulting in consumption of less energy. Buck (1982) finds that renters and non-renters do not significantly ($p < 0.05$) differ in their use of home energy-saving efforts. This study asked whether female-headed and jointly-headed renter households might differ in the number of home energy-conservation behaviors reported and finds they do differ when controlled for age, number of children and type of household.

Eichner and Morris (1984) report that age is a constraint on energy-conservation behaviors. They note that older families are less adaptive and, therefore, less open to new energy-conserving behavior. Marganus and Badenhop (1984) find that families headed by a person of retirement age spend almost twice as much of their incomes on residential energy when compared to younger families. This study finds that age also makes a difference in the number of home energy-conservation behaviors reported between female-headed and jointly-headed households.

Marganus (1984) finds significant ($p < 0.05$) differences in mean energy expenditures between families with no dependents and those with two and three or more dependents. Other researchers also view the number of individuals in the household as an important determinant in the amount and the way energy is used, with an increase in individuals accounting for greater use. In this study, number of children makes a difference in home energy-conservation behavior mean scores. Therefore, the number and types of home energy-conservation behaviors reported need to be further examined to determine how age, income, number of children, and type of household differentially influence home energy-conservation behaviors in female-headed and jointly-headed renter households.

CONCLUSION

The energy beliefs and number of home energy-conservation behaviors reported differ between female-headed and jointly-headed renter households. Housing and energy educators and Extension specialists need information regarding energy-related beliefs and conservation behaviors for educational programs. As

the population of renters, particularly female-headed householders, increases and as the consequences of energy costs become more serious, knowledge of energy-related behaviors of different types of households can be used to target energy assistance and educational program content. The special needs and housing situations of female-headed renter and jointly-headed renter households are two groups that may be targeted. Additional research is needed to determine which household types, specific ages, educational levels, income levels, and number of children, need to be targeted with what specific behavioral recommendations.

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