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A Research Note on:

ECONOMIC AND PSYCHOLOGICAL CONSTRAINTS IN HOUSEHOLD ENERGY CONSERVATION

Shirley M. Niemeyer and Earl W. Morris

ABSTRACT

The purpose of this paper is to analyze the relative contributions of a number of the determinants of the propensity to engage in energy-conserving behavior. The analysis is based on data from about 200 households in five small cities in Iowa. The key findings of the paper are that resource constraints act as barriers to having an energy-efficient dwelling, but that expression of a propensity to improve the efficiency of that dwelling is constrained by resource and predisposition constraints. The findings indicate that it would be more fruitful to attempt to remove or reduce the resource constraints that serve as barriers to energy conservation than to attempt to change attitudes. Education programs might better be focused on the development of management skills, for example, than on attitude changes. In an attitude change program, the need would be, not only to change attitudes toward energy, but to change them sufficiently to overcome the resource constraints.

BACKGROUND

The general theoretical basis of the paper is a social systems approach to household behavior (Parsons and Bales, 1955). The specific theoretical basis is a model of housing adjustment (Morris and Winter, 1975; 1978; 1981; Morris, Crull and Winter, 1976). Specifically, the paper is concentrated on the apparent lack of consistency between energy-related attitudes and behavior.

A conclusion that can be derived from the voluminous attitude-behavior consistency literature is that under some conditions, the effects of attitudes are obscured by the effects of other variables (Heberlein and Warriner, 1980; Wicker, 1969; Wicker, 1971). This

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Shirley M. Niemeyer is Extension Specialist, Cooperative Extension Service,, University of Nebraska, Lincoln, Nebraska. Earl W. Morris is Professor of Family Environment, Iowa State University, Ames, Iowa. Journal Paper No. J-10842 of the Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa. Project No. 2530. This project was supported by the Graduate College and the Home Economics Research Institute in addition to the Experiment Station of Iowa State University. An earlier version of this paper was presented at the 1983 Annual Meeting of the Environmental Design Research Association, Lincoln, Nebraska.

conclusion does not lead one to abandon attitudes as an important component of theory and research on consumer behavior. Rather, it forces one to improve one's theory and methods to incorporate the other concepts and variables. It is clear that situational and personal factors, either as single predictors of behavior or in combination, should be included (Norman, 1975; Fishbein, 1967; Fishbein and Ajzen, 1974; O'Riordan, 1976; Lipsey, 1977).

Personal factors (such as dispositions, general and specific attitudes, knowledge, ability, motivation) and situational variables (such as housing prices, the cost of materials, and the cost of labor) contribute to the prediction of behavior. In addition, the situational factors may explain attitude-behavior inconsistency in that they can indicate an inability to perform a desired behavior. In this research, we emphasize two sets of variables, (1) the personal factors, which we refer to as predispositional constraints, and (2) the situational factors, which we refer to as resource constraints. Of course, these are small subsets of the potential variables in each set that could be analyzed.

ATTITUDE-BEHAVIOR CONSISTENCY IN HOUSING ADJUSTMENT

The model of housing adjustment (Morris and Winter, 1975; 1978), can be viewed as an attitude-behavior model related to family housing. The family is seen as engaging in a dynamic process of evaluation of its housing in terms of cultural and family norms (Morris and Winter, 1978). A propensity to engage in adjustment behavior may occur when a family experiences a normative housing deficit that causes a significant reduction in housing satisfaction. If the deficit is salient, housing satisfaction would be low, and the propensity to engage in adjustment behavior would appear (Morris and Winter, 1978). The propensity to reduce the deficit may cause adjustment behavior to appear through moving to a different dwelling or altering the current one.

Specifically, in this analysis, it is postulated that, if the family's housing fails to meet its norms for energy efficiency, a deficit exists. If the energy deficit is salient, dissatisfaction occurs, and a propensity to engage in energy-saving adjustment behavior results. Factors that influence the occurrence of energy deficits are the resource and predisposition constraints. Resource constraints are factors that restrict a household's ability to afford adjustment behavior. Predisposition constraints are factors that restrict the household's skills and motivation to engage in housing adjustment behavior. The propensity to engage in adjustment behavior includes (1) retrofitting the current dwelling or (2) moving to a dwelling that is more energy efficient.

PROCEDURES

The sample is a systematic random sample of 198 households selected from the five largest cities in the area surrounding Fort Dodge, Iowa. The largest has a population of about 35,000 and the smallest about 8,000. Extensive personal interviews were conducted between November 1981 and March 1982 with the head of the household, the spouse of the head, or both in some circumstances. The unit to be analyzed is the household and includes all individuals

currently residing in the dwelling. The completion rate was 66 percent for 198 households from an original sample of 300.

Single-item measures were used to measure resource constraints (income, sex, age, education, household size, marital status, and home ownership), and housing satisfaction. Composite measures were constructed to measure predisposition constraints (personal control, responsibility, optimism, flexibility, expectations), resource constraints (household income, subjective economic constraints), belief in the energy problem, energy conditions, and the propensity to engage in energy-conserving behavior through alterations or mobility. Details on the construction of these measures are available from the senior author.

The *Propensity for Conservation Alterations* is an inclination or tendency to improve the energy efficiency of the current dwelling through retrofitting. The *Propensity for Conservation Mobility* is an inclination to move to a different dwelling for the purpose of saving energy. *Energy Satisfaction* is an index of how satisfied respondents are with the energy efficiency of their current dwelling. *Belief in the Energy Problem* indicates the degree to which the respondent believes in the existence and the seriousness of the energy problem.

Constraints are measured in terms of resources available and attitudinal predispositions. *Predispositions* refer to the individual's beliefs and attitudes related to residential energy. They include the expectations for solutions to the energy problem, feelings of personal control, flexibility or mutability, degree of responsibility felt, and optimism. Age, education, sex, home ownership, household income, household size, and subjective economic constraints are included as indicators of *Resource Constraints*. The two sets of exogenous variables, resource constraints and predispositions, serve as independent variables, and their relative contributions to the explanation of the endogenous variables in the model are evaluated in the analysis.

Belief in the Energy Problem The results of the analysis of belief in the energy problem regressed on the resource and predisposition constraints (Table 1), indicate that five of the hypothesized relationships are statistically significant. Household income, subjective economic constraints, responsibility, expectation of tensions as a result of the energy problem, and expectation of solutions to the energy problem are significant determinants of belief in the energy problem Twenty-six percent of the variance in belief is explained by the constraint factors.

Energy Conditions The analysis of the energy conditions regressed, on belief and selected constraint variables (Table 2) reveals that six of the hypothesized relationships are statistically significant. Education of the head of the household, age of the head, sex of the head, home ownership, subjective economic constraints and belief in the energy problem are significant determinants of the energy conditions of the dwelling.

Home ownership is the strongest determinant of the energy conditions of the dwelling. Twenty-six percent of the variance in energy conditions is explained by the belief in the energy problem

and the significant constraint factors.

Energy Satisfaction The analysis is performed with energy satisfaction as the dependent variable regressed on the energy conditions of the dwelling, belief in the energy problem, and selected resource and predisposition constraints (Table 3). Four of the hypothesized relationships are statistically significant.

The energy efficiency of the dwelling is a strong determinant of energy satisfaction. The energy conditions, household size, education of the head, and subjective economic constraints explain 33 percent of the variance in energy satisfaction.

Propensity for Conservation Mobility The analysis of the propensity to move on energy satisfaction, energy conditions, belief in the problem, and selected resource and predisposition constraints (Table 4) indicates that five of the hypothesized relationships are statistically significant. The education of the household head, personal control, expectation of tensions, and energy satisfaction are significant determinants of the propensity to move in the reduced model.

Propensity for Conservation Alterations The analysis of propensity to conserve energy through alterations, regressed on energy satisfaction, energy conditions, belief in the problem and selected resource and predisposition constraints (Table 5), reveals that seven of the hypothesized relationships are statistically significant in the full model. Energy satisfaction, household size, age of the household head, and home ownership are significant direct determinants of the propensity to conserve through alterations.

Household income and the education of the household head are significant predictors of the propensity to alter. The level of responsibility felt for the energy problem is a significant predictor of the propensity to retrofit. The four variables, household size, age of the head of the household, home ownership, and energy satisfaction, explain 29 percent of the variance in the propensity to conserve through alterations to the dwelling.

Block Analysis A block regression analysis revealed that predisposition and resource constraints contribute similarly to the explanation of the propensity to engage in energy-conserving behavior through mobility. Each of them independently explains about seven percent of the variance in the propensity, and together, they explain about 13 percent.

There is a distinct difference in the relative contributions of resource and predisposition constraints to the explanation of the variance in the propensity to engage in energy-conserving alterations. Resource constraints, when considered alone, contribute about 25 percent to the explanation of intent to alter. Predispositions contribute only about two percent to the explanation of intent to alter. Combined, they explain about 27 percent.

FINDINGS

The causal chain of relationships among the endogenous variables are all statistically significant as shown in Figure 1. The central idea of the model, which is supported by the analysis, is that chain. The propensity to engage in energy-conserving behavior is a function of energy satisfaction, which is a response to the energy conditions of the dwelling, which in turn, is a response to the belief in the energy problem.

DISCUSSION

There are four major findings derived from the analysis. First, resource constraints as a group of variables is the key explanation of the number of energy-saving conditions present in the dwelling. Households with fewer resources are more likely to live in dwellings that have fewer energy-saving characteristics.

Second, satisfaction with the energy characteristics of the dwelling is significantly affected by the presence of those characteristics. Households living in dwellings with many energy-saving features are more satisfied with the energy efficiency of the dwelling than are households living in dwellings with fewer such characteristics. However, the presence of resource constraints reduces satisfaction below the level expected on the basis of the characteristics alone. Households with fewer resources are less likely to be satisfied with the energy efficiency of the dwelling even in similar dwellings.

Third, the propensity to move to a different dwelling to save energy is about equally influenced by resource limitations and attitudinal predispositions. Both attitudes and resources can reduce the probability that a propensity to move exists whether the family is satisfied with the energy efficiency of the dwelling or not. However, the most important determinant (among the variables analyzed) of wanting to move is being dissatisfied with the energy efficiency of the dwelling.

Fourth, the main barriers to the propensity to save energy through alterations to the dwelling are the resource constraints. Households with fewer resources are less likely to have such a propensity. Attitudinal predispositions play almost no role in determining the propensity to make energy-saving alterations. Being dissatisfied with the energy efficiency of the dwelling tends to lead to wanting to make alterations to save energy but is weaker than the resource constraints.

If the goal of energy policy is to encourage energy-saving behavior there are obvious implications that may be drawn from the analysis. Programs that would have the effect of removing resource constraints that prevent energy-saving behavior should be adopted. Programs that depend upon changing the attitudinal predispositions of members of the society would not be suggested on the basis of these results.

These findings seem to be consistent with theory and research on

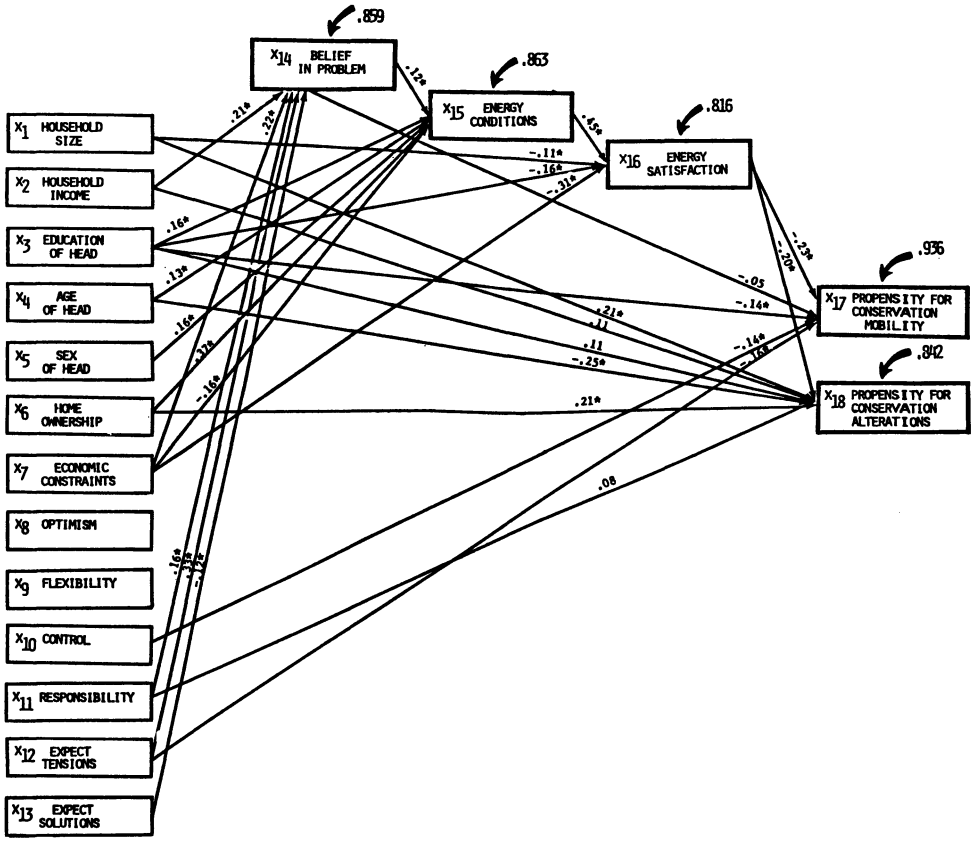

Figure 1. Path Analysis

attitude-behavior consistency in that recent research indicates that behavior frequently is inconsistent with attitudes because of the presence of various constraining factors that prevent the occurrence of the behavior needed for consistency. Further, it seems quite clear that attitude-change programs have a formidable task if they are to successfully alter attitudes so greatly that, not only are they changed, but are also strong enough to overcome the constraints on behavior. To remove the constraints impinging on those who already have positive attitudes seems a much more fruitful policy approach. With respect to educational programs, focusing on the development of the family's management skills (that might then increase their resources or better use those they have) would appear more fruitful than to try to change attitudes.

Table 1. Regression of belief in energy problem on constraint variables

Variable		Full Model		Reduced Model	
	r	beta	t	beta	t
RESOURCE CONSTRAINTS					
Household size	.22	.039	0.44		
Household income	.16	.154	1.81*	.208	3.11*
Education	.14	.058	0.70		
Age (Head)	-.16	-.033	-0.38		
Sex (Head)	.14	.026	0.34		
Home ownership	.08	.055	0.72		
Subjective economic constraints	.24	.192	2.64*	.219	3.26*
PREDISPOSITIONS					
Optimism	-.21	-.094	-1.23		
Flexibility	-.02	.080	1.12		
Control	-.01	.014	0.19		
Responsibility	.24	.166	2.28*	.158	2.33*
Expect tensions	.37	.296	4.10*	.325	4.77*
Expect solutions	-.16	-.115	-1.66*	-.119	-1.77*
R-squared		.287		.262	
Adjusted R-squared		.229		.240	
df		13 & 160		5 & 168	
F-ratio		4.95*		11.94*	

*Significant at the 0.10 level.

Table 2. Regression of energy conditions on constraints and belief

Variable		Fully Recursive		Reduced Recursive	
	r	beta	t	beta	t
RESOURCE CONSTRAINTS					
Household size	.10	.045	0.52		
Household income	.27	.006	0.07		
Education	.14	.161	1.93*	.163	2.23*
Age (Head)	.10	.176	2.01*	.131	1.73*
Sex (Head)	.22	.133	1.71*	.160	2.22*
Home ownership	.42	.350	4.63*	.370	5.20*
Subjective economic constraints	-.08	-.146	-1.96*	-.157	-2.20*
PREDISPOSITIONS					
Optimism	.06	-.015	-0.20		
Flexibility	.09	.105	1.47		
Control	.15	.105	1.45		
Responsibility	-.05	-.028	-0.38		
Expect tensions	-.11	-.105	-1.38		
Expect solutions	.04	-.010	-0.14		
ENDOGENOUS VARIABLES					
Belief	.14	.162	2.05*	.119	1.70*
R-squared		.293		.255	
Adjusted R-squared		.230		.228	
df		14 & 159		6 & 67	
F-ratio		4.70*		9.54*	

*Significant at the 0.10 level.

Table 3. Regression of satisfaction on the constraints, belief, and conditions

Variable		Fully Recursive		Reduced Recursive	
	r	beta	t	beta	t
RESOURCE CONSTRAINTS					
Household size	-.15	-.140	-1.68*	-.114	-1.75*
Household income	.12	.047	0.57		
Education	-.09	-.171	-2.13*	-.164	-2.58*
Age (Head)	.22	.027	0.31		
Sex (Head)	.07	.086	1.15		
Home ownership	.13	-.006	-0.08		
Subjective economic constraints	-.36	-.326	-4.56*	-.306	-4.70*
PREDISPOSITIONS					
Optimism	.07	-.173	0.00-		
Flexibility	.10	.075	1.09		
Control	.08	.006	0.09		
Responsibility	-.01	.046	0.65		
Expect tensions	-.15	-.087	-1.19		
Expect solutions	.09	.025	0.37		
ENDOGENOUS VARIABLES					
Belief	-.01	.083	1.09		
Conditions	.43	.388	5.14*	.446	6.96*
R-squared		.361		.334	
Adjusted R-squared		.300		.319	
df		15 & 158		4 & 169	
F-ratio		5.94*		21.22*	

*Significant at the 0.10 level.

Table 4. Regression of propensity to move on the constraints, belief, conditions, and satisfaction

Variable		Fully Recursive		Reduced Recursive	
	r	beta	t	beta	t
RESOURCE CONSTRAINTS					
Household size	.11	.122	1.28		
Household income	-.08	.085	0.91		
Education	-.15	-.186	-2.10*	-.141	-1.92*
Age (Head)	-.06	-.067	-0.70		
Sex (Head)	-.02	-.101	-1.19		
Home ownership	-.04	-.067	-0.77		
Subjective economic constraints	.19	.128	1.48		
PREDISPOSITIONS					
Optimism	-.04	-.056	-0.68		
Flexibility	.00	.047	0.60		
Control	-.17	-.151	-1.93*	-.143	-1.96*
Responsibility	.04	.097	1.20		
Expect tensions	-.15	-.175	-2.12*	-.158	-2.00*
Expect solutions	-.12	-.087	-1.16		
ENDOGENOUS VARIABLES					
Belief	-.13	-.161	-1.86*	-.053	-.673
Conditions	-.08	.083	.090		
Satisfaction	-.20	-.177	-1.96*	-.228	-3.09*
R-squared		.186		.123	
Adjusted R-squared		.103		.097	
df		16 & 157		5 & 168	
F-ratio		2.24*		4.70*	

*Significant at the 0.10 level.

Table 5. Regression of the propensity to alter on belief, conditions, and satisfaction

Variable		Fully Recursive		Reduced Recursive	
	r	beta	t	beta	t
RESOURCE CONSTRAINTS					
Household size	.38	.223	2.58*	.212	2.60*
Household income	.04	-.144	-1.70*	-.112	-1.42
Education	.18	.162	1.93*	.114	1.42
Age (Head)	-.39	-.234	-2.68*	-.249	-2.93*
Sex (Head)	.17	.082	1.07		
Home ownership	.15	.229	2.90*	.206	2.87*
Subjective economic constraints	.18	-.011	-0.15		
PREDISPOSITIONS					
Optimism	.04	.088	1.17		
Flexibility	.02	.027	0.38		
Control	.11	.052	0.74		
Responsibility	.06	.140	1.92*	.080	1.21
Expect tensions	.03	-.011	-0.15		
Expect solutions	-.02	.013	0.187		
ENDOGENOUS VARIABLES					
Belief	.01	-.104	-1.32		
Conditions	-.07	-.087	-1.03		
Satisfaction	-.29	-.189	-2.30*	-.202	-2.95*
R-squared		.327		.291	
Adjusted R-squared		.258		.261	
df		16 & 157		7 & 166	
F-ratio		4.76*		9.72*	

*Significant at the 0.10 level.

REFERENCES

Fishbein, M. (Ed.). *Readings in attitude theory and measurement*. New York: John Wiley & Sons, 1967.

Fishbein, M., & Ajzen, I. Attitudes toward objects as predictors of single and multiple behavioral criteria *Psychological Review*, 1974, *81*, 59-74.

Heberlein, T. A. & Warriner, G. K. *Attitude, motive, ability and knowledge: Factors affecting household peak load reductions in consumption of electricity*. Madison, Wisconsin: University of Wisconsin, Department of Rural Sociology, 1980.

Lipsey, M. W. Attitudes toward the environment and pollution. In S. Oskamp (Ed.), *Attitudes and opinions*, Englewood Cliffs, New Jersey: Prentice-Hall, 1977.

Morris, E. W., Crull, S. R., & Winter, M. Housing norms, housing satisfaction, and the propensity to move. *Journal of Marriage and the Family*, 1976, *38*, 309-321.

Morris, E. W., & Winter, M. A theory of family housing adjustment. *Journal of Marriage and the Family*, 1975, *37*, 79-88.

Morris, E. W., & Winter, M. *Housing, family and society*. New York: John wiley & Sons, 1978.

Morris, E. W., & Winter, M. *The current status of the theory*. Presented as part of a symposium. Theory and research on housing adjustment: A sociological approach to family behavior, Environmental Design Research Association, Ames, Iowa. April, 1981.

Norman, R. Affective-cognitive consistency, attitudes, conformity, and behavior. *Journal of Personality and Social Psychology*, 1975, *32*, 83-91.

O'Riordan, T. *Environmentalism*. Brondesbury Park, London: Pion Limited, 1976.

Parsons, T. C. and Bales, R. F., (Eds.), *Family socialization and interaction process*. Glencoe, Illinois: Free Press, 1955.

Wicker, A. W. Attitudes versus actions: The relationship of verbal and overt behavioral response to attitude objects. *Journal of Social Issues*, 1969, *25* (*4*), 41-78.

Wicker, A. W. An examination of the "other variables" explanation of attitude-behavior inconsistency. *Journal of Personality and Social Psychology*, 1971, *19*, 18-30.