PREDICTING RESIDENTIAL ENERGY
CONSUMPTION FROM
HOMEOWNER'S ATTITUDES

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Abstract

Two surveys were conducted to examine the relationship between homeowners' attitudes toward energy use and their actual summer electric consumption. In Survey 1, 56 couples filled out questionnaires concerning their energy attitudes. A factor analysis of their responses revealed four factors: comfort and health concerns, effort to conserve and monetary savings, role of the individual, and legitimacy of the energy crisis. The factors were entered into a multiple regression analysis to predict actual summer electric consumption. The attitudinal factors together significantly accounted for 55% the variance in summer electric consumption. The comfort and health factor by itself explained 30% of the consumption variance. Survey 2, consisting of 69 couples, was conducted to elaborate the meaning of the factors. The results of the factor analysis of Survey 2 revealed six factors: comfort, health, individual's role, belief in science, legitimacy of the energy crisis, and effort to conserve. An overall regression analysis showed that the factors significantly explained nearly 60% of the summer consumption variance. The comfort factor was again the best predictor of summer electric consumption, accounting for 42% of the variance. It was concluded that attitudes about one's comfort are significantly related to household energy consumption (primarily air conditioning). The implications for energy conservation campaigns were discussed.
Predicting Residential Energy Consumption from Homeowners' Attitudes

Energy conservation is one of the principle components of the federal government's energy policy. One of the ways in which conservation might be achieved is to make direct appeals to individuals to conserve. In fact, various governmental agencies, utility companies, private industries, and others have made energy conservation exhortations through public service media presentations, in brochures sent with utility bills, as part of regular advertising, and the like. These conservation messages appear to be designed to stimulate various consumer motivations, for example, economic (saving energy means saving money) and moral (we should conserve energy for future generations). One assumption of these energy conservation campaigns is that the attitude that the campaign centers upon corresponds to people's actual consumption of energy. Yet, there is surprisingly little evidence that this is the case.

During the past several years, many surveys have been conducted to assess individuals' attitudes toward the energy crisis, their energy habits, and their willingness to conserve (see Lopreato & Meriwether, Note 1, for an annotated bibliography). In general, these surveys have been largely descriptive, their intent being to document what the public thinks about various energy related issues and what their energy practices are (Milstein, Note 2; Newman & Day, 1974; Perlman, Warren, Hahn & Rivera, Notes 3 and 4). For example, in Perlman et. al. (Notes 3 & 4) we are told, among other details, what percentage of respondents claimed to have decreased their use of various appliances. We are not informed, however, of how these self-reported conserving actions relate to the respondents' attitudes. In some cases, descriptive surveys are conducted
at regular intervals, weekly or monthly, for several months or even years (Milstein, Note 1; Murray, Minor, Bradburn, Cotterman, Frankel, & Pisarski, 1974). Since these surveys have been contracted by federal agencies, they are used presumably as input in policy analyses and decision making.

The information that descriptive surveys provide may be valuable for various purposes, e.g., to indicate which of several "energy crises" solutions might be palatable to the public. However, the previously conducted descriptive surveys do not illuminate the relationship between consumers' attitudes and their actual energy consumption. This is obvious when we consider that most previously conducted energy surveys do not even collect actual energy consumption data. Respondents' self-reports of past, present, and future consumption have been assumed to reflect accurately real consumption patterns. The self-report measure is especially suspect in view of the social desirability of expressing concern about energy conservation.

It is perhaps for the reason that previous surveys have not looked at actual energy consumption that attempts to predict conservation behavior have failed. Murray et al. (1974) were not able to find any statistically significant relationships between reported temperature reduction or use of major appliances and any nondemographic variables. Curtin (1976) tried to predict reported past conservation behavior and expected difficulty of future conservation from fourteen demographic and attitudinal variables. The resultant squared multiple correlations ranged from .014 to .113, which are quite small values. Newman and Day (1975) did collect actual energy consumption data but they were
interested in describing how consumers use energy rather than in relating consumption to attitudinal dimensions.

The purpose of the present research was to begin the first step toward establishing the relationship between attitudes toward energy use and actual residential energy consumption. It is important to do this because once we have derived reliable attitudinal predictors of real energy consumption, subsequent research can begin to design energy campaigns that are explicitly directed at changing these attitudes. It is only after we know what attitudes are relevant to energy consumption that we can sensibly investigate experimentally the practicality of energy campaigns to change attitudes and energy consumption levels.

In the present research, homeowner couples were asked to complete questionnaires about their attitudes toward energy use. Factor analyses were performed to reveal the homeowners' underlying attitudinal factors. The factors were then used to predict actual summer electric consumption.

Survey 1

Method

Respondents. Respondents were 56 couples living in a planned unit development in New Jersey. The respondents are relatively homogeneous: the average husband is in his mid thirties, his wife in her early thirties. The majority of couples have one or two pre-school children. About two-thirds of the males and almost half of the females have a college degree. Forty-four of the couples in the survey sample live in three-bedroom townhouses and 14 live in two-bedroom townhouses. Within each bedroom size, the townhouses are identical in floor plan and living space. Further, all of the townhouses are identical with regard to the house's construction
and the central air conditioning system. In the summer, electric use for the air conditioner accounts for 70% of all electric usage in these houses.

Initially 80 couples were contacted by telephone and asked if they would fill out questionnaires about their energy attitudes. The couples were drawn at random from a list of all two- and three-bedroom townhouse owners in one part of the development. Thirteen residents refused to participate in the survey. In another 11 couples, only one spouse returned his or her questionnaire; these questionnaires were excluded from the data analyses. The final sample consisted of 56 couples from whom completed questionnaires from both the husband and wife were obtained.

**Questionnaire.** The questionnaire consisted of 42 questions that were organized roughly into three basic groups: (1) background questions such as age, sex, number of children living at home, etc., (2) thermostat control questions concerning which spouse is largely responsible for setting and changing the thermostat, and (3) various attitudinal categories. These included: (a) perceived bother of conserving energy, e.g., "It is just not worth the trouble to turn off the air conditioner and open the windows every time it gets a little cooler outside." (b) discomfort in conserving energy, e.g., "While others might tolerate turning off the air-conditioner in the summer, my own need for being cool is high." (c) health questions, e.g., "It's essential to my health and well-being for the house to be air-conditioned in the summer." (d) the legitimacy of the energy crisis, e.g., "The energy crisis is a hoax." (e) belief in science, e.g., "Science will soon provide society with
a long lasting source of energy." (f) morality, e.g., "It is immoral for America to consume 40% of the world's energy resources." (g) the role of the individual, e.g., "To what degree has overconsumption by individuals contributed to this country's energy problem?" The attitudinal statements were responded to using 7-point scales. Except for the background questions, which were asked first, the questions were randomly ordered on the questionnaire.

**Procedure.** During the first week of July, potential respondents were telephoned and asked if they would be willing to answer an attitudes-toward-energy questionnaire that was developed by a group of university researchers. People who agreed were told to expect two questionnaires to be dropped off at their home on a certain day. Each member of the couple was asked to fill out his or her questionnaire independently.¹ All of the questionnaires were distributed and picked up from the residents' homes within a two week period. The respondents were also asked to give us their permission to obtain their electricity consumption from the local utility company's files. All residents agreed. Actual electric consumption (kilowatt-hours) for June, July, and August was determined for each couple in the sample.

**Results**

**Factor Analysis.** The 28 attitudinal questions were subjected to a principal factor analysis, with squared multiple correlations used as communality estimates. Eight factors were extracted with eigenvalues greater than 1. The factors were varimax rotated and Table 1 shows the factor loadings for the first four rotated factors. As the first four factors accounted for 48% of the total variance of the attitudinal
variables and 80% of the total eight factor variance, only these four were interpreted. An examination of those variables that have loadings of .45 or greater on a rotated factor suggests the following interpretation of the factors:

Insert Table 1 about here

Factor 1. The five variables (2, 5, 7, 17, and 24) having loadings greater than .45 are clearly concerned with personal comfort and personal and family health considerations. This demonstrates the importance of personal comfort and health in decisions to regulate the use of the air conditioner.

Factor 2. This factor seems to reflect two related concepts. Variables 6, 18, 20, and 25 indicate a concern for the effort or bother involved in conserving energy. Variables 1, 23, and 26 are concerned with the individual's ability to pay for his energy needs. These two concepts are related in that we can characterize this factor with the statement: "Conserving energy in the home requires a great deal of effort for too little dollar savings."

Factor 3. The two variables (12 and 19) loading highest on this factor point to the role of the individual in contributing to and alleviating the energy crisis.

Factor 4. The two variables (13 and 15) loading greater than .45 reflect the extent of individuals' beliefs about whether there are real shortages of fuels and whether it is immoral to consume too much energy.
Tentatively we can label this factor as a concern with the legitimacy of the energy crisis, i.e., those who believe there is a real shortage of fuels believe it is immoral to overconsume. Variable 27, the energy crisis is a hoax, loads third highest on this factor, .42, although it fails to meet our arbitrary criterion of .45. However, it is consistent with our tentative interpretation of the factor.

On the basis of the factor analysis, a picture has begun to emerge of how homeowners perceive their energy consumption. The basic considerations seem to involve judgments about effects of conservation on health and comfort, monetary return for one's conservation efforts, the impact of the individual consumer on conservation, and the legitimacy of the energy crisis. The purpose of the factor analysis was heuristic, to isolate reasonable attitudinal dimensions that reflected the homeowners' basic conceptualizations of energy consumption. A critical question is whether these attitudinal factors relate to actual energy consumption.

**Predicting Actual Summer Electric Consumption.** Factor scores were derived for both husbands and wives. Thus, each household comprises eight factor scores, four contributed by the wife and four by the husband. These eight factor scores were employed as predictors of each household's summer electric consumption. An overall multiple regression analysis revealed that a total of 55% of the variance in consumption was accounted for by the predictors, \( R^2 = .553, F(8,47) = 7.26, p < .001. \) Thus, our attitudinal variables were very successful in predicting energy use.

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Insert Table 2 about here

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The relationship between each factor and energy use was examined by regressing the two spouses' scores on a given factor upon consumption. Table 2 presents the multiple correlation for each factor, along with the simple correlations between each male factor score and consumption and each female factor score and consumption. The combined effect of the male and female scores on the comfort and health factor was highly significant, accounting for 30% of the variance in actual electric consumption, $R^2 = .301$, $F(2,53) = 11.41$, $p < .001$. The more a household perceived conservation as leading to discomfort and ill health, the more energy that household consumed. Scores on the effort and resultant savings factor also significantly predicted consumption $R^2 = .245$, $F(2,53) = 8.61$, $p < .001$, as did the households' scores on the individual's role factor, $R^2 = .115$, $F(2,53) = 3.43$, $p < .05$. The more energy conservation was perceived as requiring great effort for little monetary return and the less importance attached to the role of the individual in contributing to and alleviating the energy crisis, the more energy was consumed. Scores on the factor involving the legitimacy of the energy crisis accounted for only a trivial proportion of variance, $R^2 = .066$, $F(2,53) = 1.88$, $p > .10$.

**Discussion**

The results have shown (1) that homeowners' attitudes toward energy can be conceptualized into a few basic factors, and (2) that these attitudinal factors can predict actual energy consumption. Homeowners perceived their use of energy according to their judgment of the effect of energy conservation on personal comfort and health, the effort required to conserve and the monetary payoff for doing so, the ability of the individual to have an impact on the energy problem, and their belief
that the crisis is legitimate. Together these factors were capable of explaining a total of 55% of the variance in actual electric consumption. Examined singly, the comfort and health factor, the effort and resultant savings factor and the individual's role factor were significant predictors of energy use. The comfort and health factor emerged as the best single predictor of consumption, accounting for a greater percentage of consumption variance than any other factor. We will postpone a discussion of the implications of these results until the general discussion.

The factors that emerge from a factor analysis are critically dependent upon the variables that are included in it. For example, a patriotism factor could not have been extracted from our factor analysis, since no patriotism variables were included. However, it does not follow that a set of variables that are assumed to define a factor will necessarily emerge from the factor analysis. Several variables dealt with the ability of science and technology to solve the energy crisis, yet no belief-in-science factor emerged. Moreover, it is possible that a factor may emerge in which the variables loading highest on it appear unrelated, and therefore the characterization of the factor becomes difficult. Factor 4, which we have labelled as a belief in the legitimacy of the energy crisis, consists of three variables with high loadings: two concern the reality of the energy crisis and the third concerns the morality of high consumption. Clearly, to have complete confidence that this factor reflects one or another dimension, we would like to have more similar variables loading highly on it.
In any case, the purpose of our factor analysis was not to describe
unambiguously the basic dimensions into which homeowners' attitudes fall
but to establish reasonable categories that could then be tested to see
if they were related to actual energy consumption. If it were not pos-
sible to predict energy consumption from attitudinal factors, then we
would be less concerned with the validity of our characterization of
the factors. Since the factors did predict a significant portion of
the energy consumption variance, a second survey was conducted to elab-
orate the meaning of the factors. The purposes of Survey 2 were to
see (1) whether the two component factors e.g., comfort and health,
could be teased apart, (2) whether the factors could be defined more
unambiguously, and (3) whether we could replicate the Survey 1 result
of predicting over 50% of the energy consumption variance.

Survey 2

Method

Respondents. Sixty-nine couples agreed to fill out questionnaires
about their attitudes toward energy use. The respondents live in a
different part of the same community from those in Survey 1. The
characterization of the respondents given in Survey 1 would generally
apply to those in Survey 2. In Survey 2, all of the respondents live
in identically constructed three-bedroom townhouses, similar to the
respondents' houses in Survey 1.

From a list of all three bedroom townhouses owners in one part of
the town, 100 were drawn at random. The 100 homeowners were telephoned
and asked if they would be willing to participate in an energy study
that would involve filling out questionnaires. Eighteen homeowners
refused to participate; in another 13 couples only one spouse returned
his or her questionnaire. The final sample consisted of 69 couples from whom completed questionnaires from both the husband and wife were obtained. The data analyses were conducted on the 69 couple sample.

Questionnaire. The questionnaire used in Survey 2 was similar to the one used in Survey 1. Nineteen variables included in Survey 1 were repeated, although some of them were worded slightly differently to remove ambiguities. The additional variables included in Survey 2 were added to clarify the factors. In survey 1, effort and resultant savings emerged as one factor. In order to see whether the effort and savings components would split into two separate factors, we reworded some variables and added others. For example, variable 25 of Survey 1 which reads "It's just not worth the trouble to turn the thermostat up every time it gets a little cooler outside" was changed to read "It is too much effort to get up and change the thermostat setting every time it gets a little cooler outside." The second version of the variable explicitly refers to the effort involved while the first version is ambiguous about whether "worth the trouble" refers to money that could be saved or required effort or both. Variable 37, which is new, was included to increase the number of variables that dealt with a dimension of saving money. A similar logic was followed in trying to break apart the comfort and health factor. The strategy that was followed in developing Survey 2 was, in general, to include enough redundant variables that would define a suspected factor so that it would be possible for that factor to emerge.
Procedure. The same procedure that was used in Survey 1 was followed. Again the husbands and wives were asked to fill out their questionnaires independently, except that Survey 2 was conducted in September. Homeowners were asked to give us their permission to obtain their electric consumption for the previous summer months of June, July, and August. All agreed.

Results

Factor Analysis. The factor analysis was done in the same way as in Survey 1. Using the thirty-eight attitudinal questions, a principal factor analysis was performed with squared multiple correlations used as the communality estimates. Eleven factors emerged with eigenvalues greater than one. The factors were subjected to varimax rotation and the factor loadings for the first six factors are shown in Table 3. Only the first six were interpreted, since they accounted for 52% of the total variance of the attitudinal variables and 83.3% of the total eleven factor variance.

Variables having loadings greater than .45 on a factor were used to interpret the factor; this same criterion was used in Survey 1.

Factor 1. Six variables (1, 2, 7, 17, 18, and 20) had loadings greater than .45 on this factor (See Table 3). An examination of these variables indicates that the factor is concerned with personal comfort. Variables 2, 7, and 17, loaded highly on factor 1 in both Survey 1 and 2. Variables 1 and 18, which were not included in Survey 1 and had high loadings on factor 1, support the personal comfort interpretation of this factor. Variable 20, which loaded highly on the comfort factor in Survey 2, also loaded highly on the effort and resultant savings factor in Survey 1.
This inconsistency is due, unfortunately, to the ambiguity in the wording of the variable. However, overall it seems reasonable to conclude that factor 1 is a comfort factor.

**Factor 2.** The four variables (4, 16, 28, and 35) that loaded highly on this factor highlight the homeowners' belief in the ability of science and technology to solve the energy crisis. Variables 4, 16, and 28 were included in Survey 1, but they did not load highly on any of the four major factors. A belief-in-science factor was not found in Survey 1.

**Factor 3.** Variables 3, 11, 12, 19, 34, and 38 had loadings greater than .45 on this factor. Four of these variables (11, 12, 19 and 34) suggest that this factor is concerned with the opportunity of the individual to play a significant role in conserving energy. This factor was also evident in Survey 1 in which variables 12 and 19 defined the factor. Variable 11, which was worded slightly differently in the two surveys, only loaded highly on this factor in Survey 2. Variables 3 and 38 indicate the individual's judgment of the severity of the energy crisis. Yet, both of these variables (3 and 38) tended to load relatively highly on other factors in addition to Factor 3. Since the other variables which loaded on Factor 3 did so exclusively, we will consider this factor to reflect the individual's role in energy conservation.

**Factor 4.** Variables 6, 25, and 38 loaded highly on this factor. Recall that variable 38 also loaded highly on factor 3. Variables 6 and 25 indicate the effort involved in conserving energy in an absolute sense, whereas variable 38 implies the relative effort involved compared to other activities. Variable 14, which has a loading of .42, is also concerned with effort to conserve. Variables 6 and 25 also
loaded highly on the effort and resultant savings factor in Survey 1. In general this factor is similar to the effort and resultant savings factor of Survey 1, although the emphasis in Survey 2 seems to be more on effort than savings.

**Factor 5.** Two variables (24 and 33) that are statements about health loaded highly on this factor. Variable 24 also loaded highly on the comfort and health factor in Survey 1. Thus we conclude that factor 5 is a health factor.

**Factor 6.** Variables 13, 22, and 27 loaded highly on this factor. All are concerned about the legitimacy of the energy crisis and we will label this factor accordingly. Variables 13 and 27 also loaded highly on this factor in Survey 1.

In the main, the factors that emerged in Survey 2 are consistent with those of Survey 1. In Survey 2, comfort and health were shown to be two factors rather than the one of Survey 1. The effort and resultant savings factor of Survey 1 did not break into two components, but the character of the factor seems to suggest it is concerned more with effort than savings. The individual's role factor appeared in Survey 2, as it did in Survey 1. The legitimacy of the energy crisis factor was replicated in Survey 2. Only one new factor emerged in Survey 2: one dealing with the individual's belief in the ability of science and technology to solve the energy crisis. We will now examine the extent to which the factors of Survey 2 predict actual summer electric consumption.
Predicting Actual Summer Electric Consumption. As in Survey 1, factor scores were derived for both the husbands and wives. Thus, taking the sex of the factor into account, each household contributes 12 factors. The factors were entered into a multiple regression to predict each household's actual summer consumption. This overall regression analysis revealed that a total of nearly 60% of the variance in energy use could be explained by these attitudinal predictors, $R^2 = .592$, $F(12, 56) = 6.78$, $p < .001$. Thus, the attitudinal variables were again very successful predictors of electric consumption.

As in Survey 1, the strength of the relationship between each factor and consumption was examined. Male and female scores on a given factor were regressed upon consumption. Table 4 presents the resulting multiple correlation for each factor, along with the simple male factor score-consumption correlations and the simple female factor score-consumption correlations. The regression analysis involving the comfort factor revealed that 42% of the variance in energy use was significantly accounted for by the spouses' comfort scores, $R^2 = .419$, $F(2, 66) = 23.78$, $p < .001$. A household's scores on the health factor also significantly related to consumption, $R^2 = .108$, $F(2, 66) = 3.98$, $p < .05$. Thus, the more a couple perceived air-conditioning to be important to their comfort and critical to their family's health, the more electricity they consumed. The other regression analyses revealed that none of the four remaining factors significantly predicted energy use: Individual's role, $R^2 = .049$, $F(2,66) = 1.71$; Effort, $R^2 = .030$, $F(2,66) = 1.02$; Belief in Science, $R^2 = .011$, $F < 1$; Legitimacy of the Energy Crisis, $R^2 = .004$, $F < 1$. 
General Discussion

The results of the two factor analyses are consistent with each other. All of the components of the factors of Survey 1 reemerged in Survey 2, albeit some in a different form. The attempt to break apart the comfort-health factor of Survey 1 into two separate factors was successful. However, we were not able to dissociate completely the two components of the effort-and-resultant-savings factor. This may underscore the importance of rewarding conservation behavior. It also implies that as energy costs increase further, homeowners might be more willing to make the efforts required to conserve. Recent studies by Hays and Cone (in press), Seaver and Patterson (1976), and Winett, Kagel, Battalio, and Winkler (in press) suggest that both providing social recognition rewards and monetary rebates for energy conservation are effective strategies to reducing energy use. The legitimacy-of-the-energy-crisis factor appeared weakly in Survey 1 but more strongly in Survey 2. Considering the amount of media coverage surrounding the issue of whether we do in fact have an energy crisis in this country, it is not surprising that such a factor should emerge. However, further research is needed to examine whether our legitimacy-of-the-energy-crisis factor reflects a belief that fuel shortages are genuine, i.e., that energy resources are finite, or a belief that energy shortages are due to shortsighted government policy and/or supply manipulations by the relevant business concerns. Of course, both beliefs can be held simultaneously. The one new factor that emerged in Survey 2 was the belief-in-science factor.
While individuals might conceptualize their use of energy in terms of the factors discussed above, the results of the regression analyses demonstrate that only a few factors significantly predicted actual energy consumption. In Survey 1, the best predictor of summer electric consumption was the comfort-and-health factor. Similarly, in Survey 2, the comfort factor and the health factor were the best (and, in fact, the only significant) predictors. These were the only predictors that were consistent across the two studies. The effort-and-resultant-savings factor and the individual's role factor, which were significant predictors in Survey 1, were not significant predictors in Survey 2. Considering the amount of electric consumption variance that was explained by the comfort and health factor(s) in the two surveys, we can reasonably conclude that, at least for the present samples, it is the most important determinant of actual summer electric consumption. Conclusions need to be more cautious and tentative with regard to those factors that were significant predictors in one survey but not in the other.

The implications of the results for energy conservation campaigns are clear. If the strongest determinant of residential summer energy consumption is the individual's need to live in a comfortable temperature, then that issue is what should be addressed. Individuals should be better informed about how to cool their houses without air-conditioning, e.g., regulating the use of window shades and drapes, opening windows in the evening as soon as the outside temperature begins to drop, using window and attic fans, etc. Without doubt, once the comfort issue is recognized for its importance in energy conservation, imaginative and effective campaigns will be developed.

Although individuals may perceive the energy crisis in terms of a legitimacy dimension, it does not appear to affect their actual consumption. In
neither survey did the legitimacy factor relate significantly to consumption. Perlman et al. (Note 3) similarly found that people reported behaving the same way in response to the energy crisis regardless of whether they believed it was legitimate. However, one's opinion of the legitimacy of the energy crisis may affect other energy-relevant behaviors, e.g., one's willingness to accept and support legislation that will involve individual sacrifice and abstinence. This point highlights the need for future surveys to examine the ramifications of attitudinal factors on a host of measures.

The individual's role factor was found to act as a significant predictor of consumption in Survey 1, but not in Survey 2. However, the multiple correlation between the individual's role factor and consumption in Survey 1 (multiple $r = .338$) was not significantly different from the multiple correlation between the individual's role factor and consumption in Survey 2 (multiple $r = .222$, $Z < 1$). While further research is needed to clarify this factor, we may tentatively conclude that conservation appeals should emphasize the importance of the contribution of the individual.

The effort-and-resultant-savings factor was also a significant predictor in Survey 1, but not in Survey 2. Moreover, the multiple correlation between the effort-and-resultant-savings factor and consumption in Survey 1 (multiple $r = .495$) was significantly different from the multiple correlation between the effort factor and consumption in Survey 2 (multiple $r = .172$, $Z = 1.99$, $p < .05$). One possible explanation is based on the fact that Survey 1 was conducted in early July at the beginning of the air-conditioning season while Survey 2 was conducted in September toward the end of the cooling season. While we do not have any data on this point, perhaps the salience of effort and saving money is perceived differently at these two times. In July, effort and conservation savings are potentials; in September, they have either taken place or not.
The strong relationship between attitudes and behavior found in the present research may appear surprising in view of the previous literature that shows attitudes to be poor predictors of behavior (Kiesler, Collins & Miller, 1969; Wicker, 1969). It is unclear from the present research whether energy consumption behavior is a consequence of energy attitudes or whether energy attitudes are attributions derived from energy practices that developed in response to specific demands (Bem, 1972). In this regard, it would be interesting for future research to examine the stability of the attitude-behavior relationship found in the present research for individuals who hold intrinsic versus extrinsic reasons for conserving energy (Staw, 1976). Salancik (Note 5) has found that individuals who conserve for intrinsic reasons (e.g., "I wanted to explore new ways of running my life without being dependent on consuming a lot of energy and fuel") rather than extrinsic reasons ("The cost of using energy had increased to a point where I found it necessary to cut down my consumption") intend to conserve differently in the future depending upon their perception of the future severity of the crisis. Those with extrinsic reasons for conserving energy only intend to conserve when the crisis is severe. Those with intrinsic reasons intend to conserve regardless of whether the crisis becomes more or less severe.

Finally, we wish to emphasize that the generality of the present results need to be tested with different subject populations in different communities and across weather seasons. For example, it would be interesting to know whether the same factors and regression results would appear in the winter; heating is certainly more critical to one's comfort and health than air-conditioning.
Reference Notes


References


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Footnotes

1. Of course one must consider the possibility that the husbands and wives did not fill out their questionnaires independently. Perhaps one spouse answered the questionnaire and the other merely copied the responses. As a check on this possibility we counted the number of questions to which the husband and wife responded exactly the same. In no case were spouses' responses to the entire questionnaire identical. The median number of identical responses was 7 out of a possible 28 questions. In fact, only 2 of the 56 couples had identical responses on more than 50% of the questions. Thus there is no evidence that subjects did not fill out their questionnaires as instructed.

2. Separate factor analyses on males and females were also conducted. The same four factors as reported above were apparent for both males and females.

3. Factor scores were derived for both husbands and wives, because we believe that both are important in decisions to control the thermostat setting. In response to the question "In general, who is responsible for controlling the thermostat setting in the house," 27 of the 56 households answered that both spouses were. Of the remaining households, the wives were more responsible in 21 cases and the males in eight. It should be emphasized that we asked about general responsibility for thermostat control and not about exclusive control. Our experience with people in this community would lead us to believe that it would be rare for only one spouse to exercise thermostat control. In this community, most of the women are home during most of the days. Our impression from talking to many homeowners is that the typical pattern of thermostat control is that the wife, who is home during the day, adjusts the thermostat setting to her own comfort. The husband, when he returns home from work in the evening, may or may not change the
thermostat setting, depending on his own need to be cooler than his wife. Thus even in households where the wife is reported to be more responsible for thermostat control, it does not necessarily imply that the husband is unconcerned, but perhaps only that his comfort needs coincide with his wife's.

4. As in Survey 1, we again checked to see how many times husbands and wives gave identical responses to the questionnaire items. Again, in no case were spouses' responses to the entire questionnaire identical. The median number of identical responses was 11 out of a possible 38 questions. Only 8 of the 69 couples had identical responses on more than 50% of the questions, and none on more than 70%. We also examined the question of how many times identical responses would result if each woman were to be paired with each man. In this analyses, the median number of identical responses created by forming all possible pairs of men and women was 8 out of a possible 38 questions.

5. As in Survey 1, separate factor analyses were performed on the male and female attitudinal data. For males, the six factors reported above were readily apparent. The same was true for females with one minor exception. An additional factor concerned with the financial well-being of the family (Variables 30 and 31) emerged from the analysis. This new factor did not correlate significantly with consumption ($r = -.17$). Aside from this one slight difference, all the factors from the analysis of females involved the same dimensions as reported above.

6. In Survey 2, as in Survey 1, respondents were asked which spouse was generally more responsible for controlling the thermostat. (This question was asked at the end of the survey). In contrast to Survey 1, couples were specifically asked to discuss the issue between themselves and arrive at a consensus
about who was more responsible. Three of 69 couples could not agree, 45 couples agreed that it was the wife, and 21 couples said that it was the husband. A factor analysis and regression analysis, using only the spouse that was most responsible for thermostat control, revealed results that were consistent to those presented in the text. The comfort and health factors were the only significant predictors of energy consumption.

7. Regression analyses involving male and female factor scores derived from the separate factor analyses mentioned earlier revealed this same consistency. In both surveys, for both males and females, the comfort and health factor(s) were statistically significant predictors of consumption.
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<th>Variable</th>
<th>Factor 1</th>
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<th>Factor 3</th>
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<td>1. Consumers have the right to use as much energy as they want and can pay for.</td>
<td>.19</td>
<td>(.53)</td>
<td>.29</td>
<td>.04</td>
</tr>
<tr>
<td>2. I find it very difficult to fall asleep without an air conditioner on at night.</td>
<td>(.61)</td>
<td>.28</td>
<td>.38</td>
<td>-.03</td>
</tr>
<tr>
<td>3. Nuclear power will eventually provide us with most of our energy needs.</td>
<td>.96</td>
<td>-.11</td>
<td>.02</td>
<td>.01</td>
</tr>
<tr>
<td>4. Science will soon provide society with a long lasting source of energy.</td>
<td>.26</td>
<td>.10</td>
<td>-.06</td>
<td>.22</td>
</tr>
<tr>
<td>5. It's essential to my health and well-being for the house to be air conditioned in the summer.</td>
<td>(.76)</td>
<td>.28</td>
<td>.16</td>
<td>-.06</td>
</tr>
<tr>
<td>6. It is just not worth the trouble to turn off the air conditioner and open the windows every time it gets a little cooler outside.</td>
<td>.27</td>
<td>(.62)</td>
<td>.19</td>
<td>.00</td>
</tr>
<tr>
<td>7. How uncomfortable would you be if you turned your thermostat up 3 degrees from its usual setting?</td>
<td>(.55)</td>
<td>.00</td>
<td>.11</td>
<td>-.01</td>
</tr>
<tr>
<td>8. How much of a savings per month on your summer electricity bill would it take to induce you to turn your thermostat setting up 3 degrees from its usual setting?</td>
<td>.25</td>
<td>.23</td>
<td>.05</td>
<td>-.16</td>
</tr>
<tr>
<td>9. I never feel guilty about having my air conditioner on.</td>
<td>.30</td>
<td>.17</td>
<td>.25</td>
<td>.11</td>
</tr>
<tr>
<td>10. It is immoral for America to consume 40% of the world's energy resources.</td>
<td>-.02</td>
<td>-.25</td>
<td>-.28</td>
<td>.03</td>
</tr>
<tr>
<td>11. If everyone in the country tried to conserve energy at home, there would probably be little or no real impact upon the nation's overall energy consumption.</td>
<td>.22</td>
<td>.03</td>
<td>.33</td>
<td>.07</td>
</tr>
<tr>
<td>12. To what degree has overconsumption by individuals contributed to this country's energy problem?</td>
<td>.23</td>
<td>-.22</td>
<td>(-.65)</td>
<td>.16</td>
</tr>
<tr>
<td>13. The energy crisis is largely due to real worldwide shortages of fuels needed to produce energy.</td>
<td>-.02</td>
<td>-.02</td>
<td>-.09</td>
<td>(.69)</td>
</tr>
<tr>
<td>14. I almost never think about the energy needs of Americans 100 years from now.</td>
<td>.07</td>
<td>.18</td>
<td>-.06</td>
<td>-.16</td>
</tr>
<tr>
<td>15. It is immoral to consume anymore energy than I absolutely need.</td>
<td>-.02</td>
<td>-.39</td>
<td>-.03</td>
<td>(.51)</td>
</tr>
<tr>
<td>16. American technology in the past has come to grips with all major crises and it will no doubt soon discover a solution to the energy problem.</td>
<td>.39</td>
<td>-.09</td>
<td>-.07</td>
<td>.22</td>
</tr>
<tr>
<td>17. While others might tolerate turning off the air conditioner in the summer, my own need for being cool is high.</td>
<td>(.74)</td>
<td>.30</td>
<td>.00</td>
<td>-.08</td>
</tr>
<tr>
<td>18. How difficult would it be for you to adjust to an indoor temperature of not less than 75° in the summer months?</td>
<td>.40</td>
<td>(.49)</td>
<td>.13</td>
<td>.00</td>
</tr>
<tr>
<td>19. To what degree would more conservation of energy on the part of individuals alleviate the energy problem?</td>
<td>-.04</td>
<td>-.21</td>
<td>(-.79)</td>
<td>.13</td>
</tr>
<tr>
<td>20. It's not worth it at all to sweat a little in the summer to try to save a little energy.</td>
<td>.21</td>
<td>(.58)</td>
<td>.11</td>
<td>-.05</td>
</tr>
<tr>
<td>21. The energy crisis is largely due to the federal government's lack of an adequate energy policy.</td>
<td>-.13</td>
<td>.16</td>
<td>.08</td>
<td>.12</td>
</tr>
<tr>
<td>22. The energy crisis is largely due to supply and price manipulations by the major oil companies.</td>
<td>.17</td>
<td>.01</td>
<td>.00</td>
<td>-.16</td>
</tr>
<tr>
<td>23. Trying to save pennies a day conserving energy is just not worth it.</td>
<td>.41</td>
<td>(.46)</td>
<td>.33</td>
<td>-.17</td>
</tr>
<tr>
<td>24. It's essential to my family's health and well-being for the house to be air conditioned in the summer.</td>
<td>(.74)</td>
<td>.19</td>
<td>.13</td>
<td>.02</td>
</tr>
<tr>
<td>25. It's just not worth the trouble to turn the thermostat up every time it gets a little cooler outside.</td>
<td>.08</td>
<td>(.59)</td>
<td>.22</td>
<td>-.15</td>
</tr>
<tr>
<td>26. I would only conserve energy if I could not afford to pay for it.</td>
<td>.25</td>
<td>(.76)</td>
<td>.00</td>
<td>-.12</td>
</tr>
<tr>
<td>27. The energy crisis is a hoax.</td>
<td>.23</td>
<td>.21</td>
<td>.13</td>
<td>-.44</td>
</tr>
<tr>
<td>28. If we were able to put a man on the moon within 10 years, we could certainly solve the energy crisis within a short time period.</td>
<td>.16</td>
<td>.14</td>
<td>.13</td>
<td>-.29</td>
</tr>
</tbody>
</table>

( ) indicates loading > .45
Table 2

Predicting Actual Summer Electric Consumption From Attitudinal Factors:

Survey 1

<table>
<thead>
<tr>
<th>Factor</th>
<th>Male Factor Score</th>
<th>Female Factor Score</th>
<th>Multiple Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort and Health</td>
<td>.40**</td>
<td>.53***</td>
<td>.549***</td>
</tr>
<tr>
<td>Effort and Resultant Savings</td>
<td>.41**</td>
<td>.42**</td>
<td>.495***</td>
</tr>
<tr>
<td>Individual's Role</td>
<td>.33*</td>
<td>.03</td>
<td>.338*</td>
</tr>
<tr>
<td>Legitimacy of Energy Crisis</td>
<td>-.08</td>
<td>.19</td>
<td>.257</td>
</tr>
</tbody>
</table>

* $p < .05$
** $p < .01$
*** $p < .001$
Table 4

Predicting Actual Summer Electric Consumption From Attitudinal Factors:

Survey 2

<table>
<thead>
<tr>
<th>Factor</th>
<th>Male Factor Score</th>
<th>Female Factor Score</th>
<th>Multiple Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort</td>
<td>.38**</td>
<td>.64***</td>
<td>.647***</td>
</tr>
<tr>
<td>Belief-in-Science</td>
<td>.06</td>
<td>-.06</td>
<td>.103</td>
</tr>
<tr>
<td>Individual's Role</td>
<td>.07</td>
<td>.22</td>
<td>.222</td>
</tr>
<tr>
<td>Effort</td>
<td>.17</td>
<td>.04</td>
<td>.172</td>
</tr>
<tr>
<td>Health</td>
<td>.15</td>
<td>.32*</td>
<td>.328*</td>
</tr>
<tr>
<td>Legitimacy of Energy Crisis</td>
<td>.05</td>
<td>-.04</td>
<td>.067</td>
</tr>
</tbody>
</table>

* $p < .05$

** $p < .01$

*** $p < .001$