The Role of Reference Groups and Entitativity in the Group Identification process for Personalized Normative Messaging Interventions

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ABSTRACT

Psychologists hypothesize that the effectiveness of normative messaging interventions increases when individuals have more personal attachment and similarity with reference groups. Using readily available energy consumption data, it is now possible to create highly personalized reference groups based on households' daily energy use in a non-invasive matter. However, it still remains unclear to what degree individuals perceive behavioral reference groups as a cohesive entity. Therefore, this research investigates how individuals perceive energy profile-based groups relative to more standard geographic proximity-based groups. An online survey is conducted with 1,928 U.S. adults. Individuals do not perceive the profile-based groups as very entitative groups. Also, similarity between energy profile-based group members indirectly affects individuals' identification with the groups via group entitativity. Lastly, this indirect effect is larger than the direct effect of similarity between group members on group identification. These results imply that a better understanding of what affects group entitativity would allow interveners to create more effective normative feedback messages.

KEYWORDS: Energy use behavior, normative feedback

1. INTRODUCTION

Residential buildings accounts for approximately 21% of all energy expenditures in the U.S. (EIA 2018). Interveners have used and research a wide range of intervention strategies in an attempt to reduce household energy consumption either through one-time behaviors (e.g., capital improvements) or repeated behaviors (e.g., reducing heating set points). One prominent intervention methodology, normative feedback, has emerged as a leading cost-effective strategy to encourage residents to change their behaviors toward the norm of reference groups (Anderson et al. 2017). Many studies have shown that individuals are receptive to normative feedback and on average reduce household energy use by around 2% (Allcott 2011).

Further personalizing normative feedback messages using highly similar peers for normative comparisons is hypothesized to further enhance the effectiveness of the messages. Until recently, behavioral reference groups have been mainly characterized by geographic proximity (e.g., street and city) of households and their housing characteristics (e.g., housing size and heating type) (Darby 2006). However, this personalization process has traditionally required households' participation to collect data (e.g., survey and home energy audits). As a consequence, it is financially infeasible to create highly personalized normative comparison groups on a large scale.

Recent advances in energy metering technologies now permit interveners to collect accurate household energy use profiles in a non-invasive manner. Since energy use profiles are primarily dependent on how occupants behave in their home (e.g., night time user), it is possible to create more personalized behavioral reference groups for normative comparison using the profiles in conjunction with geographic information and housing characteristics information (Richardson et al. 2010). This will in turn allow interveners to provide personalized normative feedback messages to a large scale of households. However, to what degree individuals perceive energy profile-based (EP) groups as a cohesive entity has not been investigated thoroughly yet. This is important because individuals are attached to socially cohesive groups and thus adhere to the group norm. Therefore, this research investigates individuals' perception of energy profile-based groups relative to geographic proximity-based (GP) groups. To achieve this, we develop and conduct an experimental survey that investigates how individuals perceive EP and GP groups after receiving different normative messages.

2. ROLE of SOCIAL IDENTITY in the GROUP IDENTIFICATION PROCESS

According to social identity theory, individuals shape their behaviors based on the norms of the social groups to which they belong. This group norm effect becomes more prominent for individuals who strongly identify with their groups (Terry and Hogg 1996). Several studies have discovered the significant role of identification with groups (IG) in socially significant behaviors (e.g., exercise). Additionally, it has been repeatedly reported that similarities between group members (SGM) directly effects IG and also indirectly effects IG via group entitativity (GE) which is defined as perceiving a group as a cohesive entity (Fisher and Wakefield 1998; Castano et al. 2003; Lickel et al. 2010). For example, Castano et al. (2003) found that an individuals' identification with the European Union increases not only with higher SGM but also through the mediation effect of GE. Further, several studies have reported that the group identification process is partially dependent on group type. Various social groups (e.g., family and neighbors) exhibit different levels of SGM, GE and IG (Lickel et al. 2010).

Using this theoretical foundation of how individuals identify with their groups, the following hypotheses are proposed:

- Hypothesis 1: An individuals' identification with their behavioral reference groups is affected by group type (EP vs GP).
- Hypothesis 2: Perceived entitativity of behavioral reference groups is affected by group type.
- Hypothesis 3: Perceived entitativity of behavioral reference groups mediates the effect of perceived similarity with group members on individuals' identification with the group.

3. METHODS

2,007 U.S. adults are surveyed via Amazon's Mechanical Turk in January of 2019. Seventy-nine participants did not complete the questionnaire and/or provided unreasonable responses to the two open-ended questions; these observations are excluded from analysis, resulting in 1,928 participants.

The survey is approved by the institutional review board (IRB) of the University of Michigan and is constructed as follows. First, participants are asked to provide when six high energy-consuming items (e.g., heaters and lights) are used in their homes. Since these items account for approximately 70% of all household energy use, it is possible to generate probable energy use patterns estimates for the participants. Second, participants are randomly assigned to one of two groups, GP or EP. The GP group receives a feedback message based on their nearest peers geographically. Participants assigned to EP are categorized into seven behavioral reference groups based on their daily pattern of energy use, a proxy for energy use behavior: *Night Owl*, *Early Bird*, *All Nighter*, *Midday Mover*, *Sunset User*, *Afternoon User* and *Steady User*. Complete details on the clustering process can be found in Song et al. (2019). Third, participants receive normative feedback messages based on group assignment. The messages include information about the estimated monthly energy consumption of participants, general description of their groups, comparison of energy consumption among group members, and energy saving tips. Fourth, participants are asked to answer four closed-ended questions for each

group identity variable (i.e., SGM, GE and IG) using a seven-point Likert scale (e.g., strongly disagree 1 to strongly agree 7).

The survey data is analyzed using t-test to investigate statistical differences in group similarity, group entitativity and group identification by group type. An ordinary least squares regression is also used to examine how group entitativity mediates the effect of group similarity on group identification.

4. RESULTS and DISCUSSION

4.1 Results

Group type is found to have a statistically significant effect on IG (*t-statistic* = 5.068, *p*-value < 0.001), so that we fail to reject hypothesis 1 (Fig. 1-a). Individuals are less likely to strongly identify with the EP group (*mean* = 3.05, *std. dev.* = 1.50) than the GP group (*mean* = 3.40, *std. dev.* = 1.48). Group type is found to have a statistically significant effect on SGM (*t-statistic* = -6.342, *p*-value < 0.001) (Fig. 1-b). Individuals in the EP group feels they are more similar to other group members than individuals in the GP group do (mean = 4.64, std. dev. = 1.25 vs. mean = 4.26, std. dev. = 1.33). The effect of group type is also found to not be statistically significant on GE (*t-statistic* = -0.027, *p*-value = 0.978) so we reject hypothesis 2 (Fig. 1-c). Both of the groups are perceived as not being cohesive (GP: mean = 3.46, std. dev. = 1.46; EP: mean = 3.46, std. dev. = 1.53).

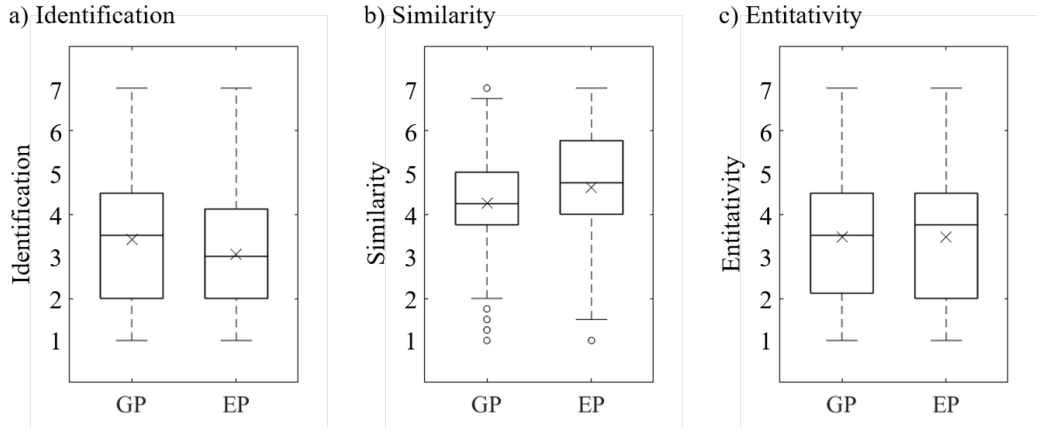

Figure 1. Similarity with group members, group entitativity, and group identification by group type.

For both of the groups SGM directly affects IG (Fig. 2). The indirect effect of SGM on IG via GE is found to be statistically significant leading us to fail to reject hypotheses 3. Interestingly, the indirect effect is found to be greater than the direct effect.

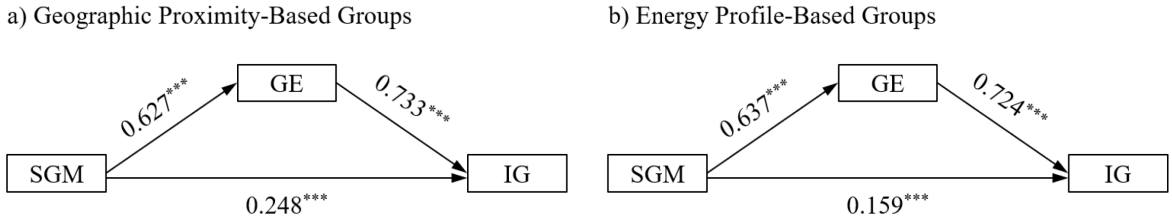

Figure 2. Relationship among similarity with group members (SGM), identification with groups (IG) and group entitativity (GE). The values in this figure indicate a regression coefficient (*b)*. Asterisks indicate *p*-value < 0.001.

4.2 Discussion

The survey data reveals that members in the EP group are do not perceive it as being entitative. In addition, the level of GE is slightly lower in EP group than GP group. These results are understandable

as individuals in the EP group are not familiar with their assigned group relative to members in the GP group that likely already recognize neighbors as a social group. Additionally, it is found that individuals are less likely to have a strong identification within the EP group. Considering that IG reinforces the group norm effect, it is necessary to enhance the entitativity of the EP group since it significantly mediates the effect of SGM on IG. This is significant because the indirect effect of SGM on IG via GE is greater than its direct effect. Several studies have discovered that GE improves with higher interaction among group members. Thus, future studies should provide individuals with more specific group descriptions including how they can interact within their EP group.

5. CONCLUSIONS

This paper investigates how individuals perceive energy profile-based groups compared to geographic proximity-based groups when receiving normative feedback messages. The results indicate that energy profile-based groups are not perceived as a cohesive entity. There is also an indirect effect of similarity with group members on group identification via group entitativity, which is surprisingly larger than its direct effect. This research contributes to the literature by investigating the current status of group entitativity across different types of normative comparison groups and the role of group entitativity in the group identification process. Further, the survey results suggest that enhancing the entitativity of energy profile-based groups may make households more strongly identify with their group. In turn this will increase the norm adherence and improve the effectiveness of normative messaging interventions. Future research should investigate how individuals' interactions within energy profile-based groups affect the group identification process.

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