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Information Seeking about Global Climate Change among Adolescents: The Role of Risk Perceptions, Efficacy Beliefs and Parental Influences

Erin Mead,

Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health

Connie Roser-Renouf,

Department of Communication, George Mason University

Rajiv N. Rimal,

Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health

June A. Flora,

Stanford University

Edward W. Maibach, and

Department of Communication, George Mason University

Anthony Leiserowitz

Yale School of Forestry and Environmental Studies, Yale University

Abstract

Global climate change is likely to have significant impacts on public health. Effective communication is critical to informing public decision making and behavior to mitigate climate change. An effective method of audience segmentation, the risk perception attitude (RPA) framework has been previously tested with other health behaviors and classifies people into 4 groups on the basis of their perceptions of risk and beliefs about personal efficacy. The 4 groups – indifference (low risk, weak efficacy), proactive (low risk, strong efficacy), avoidance (high risk, weak efficacy), and responsive (high risk, strong efficacy) – are hypothesized to differ in their self-protective behaviors and in their motivations to seek information. In this paper, we extend the RPA framework in two ways. First, we use it at the household level to determine whether parental classifications into the 4 groups are associated with their teenage children's classification into the same 4 groups. Second, we predict adolescent information-seeking behaviors on the basis of their and their parents' membership in the 4 RPA groups. Results ($N = 523$ parent-adolescent pairs) indicated that parental membership in the 4 RPA groups was significantly associated with children's membership in the same 4 groups. Furthermore, the RPA framework was a significant predictor of adolescent information-seeking: those in the responsive and avoidance groups sought more information on climate change than the indifference group. Family communication on global warming was positively associated with adolescents' information-seeking. Implications for interventions are discussed.

Keywords

Climate change; risk perceptions; efficacy beliefs; information-seeking; household

Global climate change threatens many aspects of human life (Lenton et al., 2008; WHO, 2009), including health and well-being (Mills, Gage, & Khan, 2010; Patz & Olson, 2006). Scientists are concerned about its effects on a host of health-related outcomes, including

cardiovascular diseases, respiratory allergies from increased allergen production, cancer, food-, water-, and vector-borne diseases, mental health disorders, and injuries from conflict over scarce resources (CDC, 2010; Frumkin et al., 2008). Mitigation of climate change requires a reduction in anthropogenic greenhouse gas emissions, which must be accomplished through both policy—such as fossil fuel subsidy reductions, support for renewable energy, and regulation of greenhouse gas emissions—and human behavior changes—such as increased use of public or physically active means of transportation and decreased meat and energy consumption (IPCC, Core Writing Team, 2007).

Behaviors to reduce emissions are well understood within a social ecological model, which accounts for facilitative and inhibitive influences that interact at multiple levels, including those at the individual, interpersonal, community, and public policy levels (Sallis, Owen, & Fisher, 2008). In the case of climate change, governmental policy decisions are a critical component of climate change mitigation. Corner & Randall (2011) described the inadequacy of a sole focus on the individual level; however, fostering pro-environmental attitudes and behaviors among individuals is also a critical component in the overall effort to address climate change. Individuals' attitudes and behaviors can not only reduce emissions but also strengthen public support for policy change. For instance, individuals with strong pro-environmental attitudes and values may coalesce and advocate for policy change, and the diffusion of pro-environmental attitudes and values through social networks may provide a strong normative environment to facilitate policy change. Thus, individual-level factors play an important role in climate change mitigation.

In the United States, individuals tend to view climate change as a significant global threat, but they generally do not feel personally threatened (Leiserowitz, 2005; Lorenzoni & Pidgeon, 2006). Moreover, studies have shown that many individuals feel that they have little ability to mitigate climate change (Lorenzoni & Pidgeon, 2006), and the belief that others can be mobilized to mitigate climate change is particularly weak among children and early teens, in comparison to adults (Pruneau et al., 2001). In the U.S., it appears that pro-environmental behaviors are more pronounced among adults than young people, even though many young people hold pro-environmental attitudes (Johnson, Bowker, & Cordell, 2004). Diamantopoulos, Schlegelmilch, Sinkovics, & Bohlen (2003) found that the association between age and pro-environmental attitudes (defined as concern about environmental quality) is negative, whereas the association between age and pro-environmental behaviors is positive. One possible explanation for the juxtaposition of high pro-environmental attitudes and low engagement in behaviors may be that young people feel less efficacious in their ability to bring about environmental change. The research also demonstrates that young people's environmental attitudes and behaviors are complex, requiring further research (Grønhøj & Thøgersen, 2009).

The Risk Perception Attitude Framework

Perceived risk - the belief that one is vulnerable to a disease or risk factor - is thought to be a significant predictor of self-protective behavior. In the health belief model (Janz & Becker, 1984) and protection motivation theory (Rogers, 1975, 1983), for example, perceived susceptibility (together with other concepts, such as perceived severity, perceived benefits, and perceived barriers) plays a significant role in predicting individuals' likelihood of taking preventive action. Yet, researchers who theorize a causal relation between perceived risk and behavioral action have found both positive (Dolinski, Gromski, & Zawisza, 1987; Larwood, 1978; Weinstein, 1982, 1983; Weinstein, Sandman, & Roberts, 1990) and negative (Svenson, Fischhoff, & MacGregor, 1985; van der Velde, Hooijkaas, & Pligt, 1991) associations, and still others have reported an absence of significant associations (Joseph et al., 1987; Robertson, 1977; Svenson et al., 1985). Systematic reviews and meta-

analyses have shown small, although significant, relationships between risk perception and likelihood of action (Floyd, Prentice-Dunn, & Rogers, 2000; Milne, Sheeran, & Orbell, 2000; Harrison, Mullen, & Green, 1992).

The risk perception attitude (RPA) framework (Rimal & Real, 2003) proposes that the relationship between risk perceptions and behavioral action has to be studied in the context of individuals' efficacy beliefs. This framework is derived from the extended parallel process model (EPPM), which posits that individuals' perceptions of risk act as motivators of action and are necessary but not sufficient for behavior change to occur (Witte, 1992). The primary concept of interest in the EPPM is *perceived threat*, which is conceptualized as a property of messages. In contrast, the concept of interest in the RPA framework is *perceived risk*, which is a person-level variable. Perceived threat and perceived risk are isomorphic to the extent that a threat in a message corresponds with perceived risk among individuals (which may not be applicable if nonsmokers, for example, perceive a smoking-related high-threat message as being irrelevant to them). For issues pertaining to climate change, individuals may perceive risks because of particular messages they have encountered in the media, but their risk perceptions can also be generated from other sources, including conversations and personal reflections.

The RPA framework hypothesizes that heightened risk perceptions have to be accompanied by strong efficacy beliefs in order to promote action. A similar prediction can also be derived from social cognitive theory (Bandura, 1986), which posits that those who feel efficacious are likely to construe potential risks as challenges to be overcome, whereas those lacking in efficacy typically interpret their vulnerability in a fatalistic manner (Maibach & Murphy, 1995). Thus, for sustainable behavior change to occur, individuals motivated to ameliorate their risks have to feel efficacious in their ability to take effective steps.

Based on individuals' risk perceptions and efficacy beliefs, the RPA framework identifies four attitudinal groups. First, those with high perceived risk who also possess strong efficacy beliefs are characterized by a *responsive attitude*. These individuals, being aware of the risks and believing they have the requisite skills to avert the impending threat, are expected to be most motivated in enacting self-protective behavior. Second, people with high risk perceptions and weak efficacy beliefs are characterized by an *avoidance attitude*. These individuals are likely to experience conflicting motivations. On one hand, their high risk perception likely makes them concerned, but on the other hand, their low efficacy beliefs are likely to dampen their motivations. Hence, this group is likely to be less motivated than the responsive group. Third, individuals with low risk perceptions but strong efficacy beliefs are characterized by a *proactive attitude*. They are not motivated by their perceived risk, but rather by their perceived ability to address an impending danger. Finally, those with low perceived risk and weak efficacy beliefs are likely to be the least motivated. They believe they are not vulnerable and, even if they were, they do not believe in their ability to avert the threat. They are characterized by an *indifference attitude*.

Predictions of the RPA framework have been tested across a variety of health domains, including HIV/AIDS prevention (Rimal, Brown, Mkandawire, Folda, Creel, 2009), breast cancer prevention (Rimal & Juon, 2010), breast cancer information-seeking (Lee, Hwang, Hawkins, & Pingree, 2008), diabetes information-seeking (Turner, Rimal, Morrison, & Kim, 2006), workplace safety (Real, 2008), food safety (Kennedy, Worosz, Todd, & Lapinski, 2008), and nutrition promotion (Sullivan, Beckjord, Rutten, & Hesse, 2008). This model has not yet been applied in studying behaviors, such as those pertaining to climate change, whose outcomes are thought to be both remote in the future and consequential to the larger society, as opposed to just oneself.

Although prior applications of the RPA framework used the concept of self-efficacy, the role of *response efficacy*, the belief that the actions one takes will effectively reduce the threat, is more applicable to behaviors relating to climate change for two main reasons. First, large numbers of U.S. Americans believe that climate change, if it is occurring, is the result of natural changes in the environment (Weber & Stern, 2011). Hence, they do not believe that human actions are capable of reducing the threat. Second, health behaviors, such as smoking cessation, are understood to have direct consequences for the individual's own health – i.e., high response efficacy. However, individuals, even those who accept anthropogenic causes of climate change, may perceive the potential impact of energy conservation on reducing the threats posed by climate change as miniscule, because the threat is caused by the actions of billions of individuals. We therefore focus in this research on response efficacy, rather than self-efficacy, as it is likely to be a larger barrier to issue engagement and response.

Many of the behaviors pertaining to climate change (e.g., riding a bicycle instead of driving) are enacted at the individual level, but many others (e.g., setting the home temperature at a certain level, choosing which foods to buy) are enacted at the family level. It is thus reasonable to assume that adolescents' behaviors pertaining to climate change may be driven not only by their own perceptions of risk and efficacy, but also by the perceptions of their parents, who establish the standards for household behaviors. Yet, we know relatively little about how parental perceptions of risk and efficacy are associated with their children's perceptions.

Parental influence on children has been extensively documented across a variety of domains, including political affiliation and outlook (Dalhouse, 1986; Glass, 1986; Valentino, 1985), moral and social knowledge (Smetana, 1997), and emotional competence (Denham, Mitchell-Copeland, Strandberg, Auerbach, Blair, 1997). Much of this research has emanated from the literature on family socialization processes (Baranowski & Nader, 1986; Tinsley, 1992) including social cognitive theory (Bandura, 1986). One of the primary concepts in social cognitive theory is observational learning, a process through which individuals evaluate and model the behaviors of others. To the extent that household adults act as children's socializing agents, children can be expected to model adults' behaviors. The extent to which children also model the risk and efficacy perceptions of their parents, however, has not yet been documented. Based on the above, this paper tests the following hypothesis:

H1: Within households, there will be a significant relationship between parental and adolescent membership in particular groups defined by the RPA framework categories.

Climate Change and Information-seeking among Adolescents

The particular issue we investigate pertains to adolescents' climate change-related information-seeking behaviors. Information-seeking is an important outcome across many areas of scholarship, including interpersonal relationships (Afifi, Dillow, & Morse, 2004), doctor-patient communication (Street, 1991), and coping (Folkman & Lazarus, 1980). It is recognized as an important element in dealing effectively with uncertainty (Afifi & Weiner, 2004; Babrow, Kasch, & Ford, 1998; Brashers, 2001), and it plays a critical role in chronic disease management (Gustafson et al., 1999; Johnson, 1997; Kalichman et al., 2006).

In public health scholarship dealing with global warming and climate change, researchers recognize the role of communication at both the mass media (Maibach, Roser-Renouf, & Leiserowitz, 2008; Zhao, 2009) and interpersonal (Nicholson-Cole, 2005) levels, and information-seeking is thought to be an important variable in that process (Kahlor & Rosenthal, 2009; Maibach & Priest, 2009). Furthermore, perceptions of risk are important

motivators for information-seeking behaviors (Griffin, Neuwirth, Dunwoody, & Giese, 2004; Turner et al., 2006), but for climate change-related issues, U.S. Americans' perceptions of personal harm are typically rather low, even if they believe that climate change is real (Leiserowitz, 2005, 2006). Climate change is viewed by many U.S. Americans as impacting other species, or people who are distant both geographically and temporally; images of melting polar ice and stranded polar bears may be insufficient motivators for people who have concerns that lie closer to home – e.g., their jobs, the economy, and health care (Leiserowitz, 2007). Researchers have argued that, in order to get people to act, there may be a need to evoke visceral reactions in them (Weber, 2006).

The focus of this paper is on young people – teenagers – who will have to deal with the consequences of climate change throughout their lives. Yet, relatively little is known about factors that promote information-seeking behaviors among young people with regard to climate change. Research on adolescents' information-seeking behaviors in general shows that the Internet has greatly facilitated their ability to gather information (Gray, Klein, Noyce, Sesselberg, & Cantril, 2005), but that their health-related information-seeking is rather limited (Magee, Bigelow, DeHaan, & Mustanski, 2011). We know even less about their climate-change related information-seeking.

In this paper, we focus on the relationship between teenagers' risk perceptions and efficacy beliefs, on the one hand, and their climate change-related information-seeking, on the other. We also investigate the role that parental factors play in teens' information-seeking. This is predicated on three processes that enhance parental-adolescent associations in behaviors in the home: *facilitation*, *socialization*, and *modeling*. Facilitation refers to the idea that, when parents in the home engage in a behavior (eating well, seeking information, consuming alcohol, etc.), they provide the products (e.g., certain types of foods) and intellectual environment (e.g., access to knowledge) that support similar behaviors among children. Socialization is the process through which children in the home come to acquire values and belief systems similar to those held by their parents because of the manner in which they have been raised (Peterson, & Rollins, 1987). Modeling is the process through which children observe and emulate behaviors they see in the home (Bandura, 1986). Thus, drawing on household-level associations between parental and adolescent-level factors, we hypothesize that parental risk and efficacy beliefs will be associated with corresponding beliefs among adolescents, and that adolescents' own risk perceptions and efficacy beliefs will be associated with their information-seeking behaviors.

Although adolescents who are positively disposed toward climate-friendly behaviors and policies are more likely to actively attend to information on climate change, it is likely that risk and efficacy beliefs make an additional contribution in shaping adolescents' information-seeking behaviors. Thus, adolescents who hold positive attitudes toward climate-friendly behaviors and policies, but who also hold high risk and efficacy beliefs shared by their parents, should engage in more active information-seeking. Thus, the second hypothesis to be tested is as follows:

H2: Controlling for demographic predictors and adolescent attitudes toward climate change, adolescents' information-seeking behaviors will be predicted by (H2A) their RPA framework membership; (H2B) parental RPA framework membership; and (H2C) family communication on the issue of climate change.

Methods

Recruitment and data collection

Data were collected online in two waves – between December 24, 2009 and January 3, 2010 (first wave) and between May 14, 2010 and June 1, 2010 (second wave). Respondents were members of a nationally representative panel recruited and maintained by the research firm Knowledge Networks. The panel was recruited using both random digit dialing and address-based sampling to cover households with and without landline telephones. Households without a computer were provided one to ensure their representation in the panel. The demographic variables of the panel's membership closely matched the December 2007 Current Population Survey (CPS).

Parents of adolescents aged 13 through 17 years were randomly selected for inclusion in the study. They were first screened to confirm that an adolescent was currently residing in their household and, if so, that they permitted the adolescent to complete the survey. In the first wave of data collection, 738 parents were invited to participate, 345 (47%) of whom completed the screener; in 250 households, both the parent and the adolescent completed the survey (34% completion rate). In the second wave, 855 parents were invited, 376 (44%) of whom completed the screener; 273 households completed the survey (32% completion rate).

To reduce the effects of any non-response and non-coverage bias in the overall panel membership, a post-stratification adjustment was applied to the merged sample using demographic distributions from the most recent data from the CPS. The post-stratification variables were: gender (male/female), age (18–29, 30–44, 45–59, and 60+ years), race/Hispanic ethnicity (White/non-Hispanic, Black/non-Hispanic, other/non-Hispanic, 2+ races/non-Hispanic, Hispanic), education (less than high school, high school, some college, bachelor and beyond), census region (northeast, midwest, south, west), metropolitan area (yes, no), and Internet access (yes, no). Benchmark distributions for Internet access among the U.S. population of adults were obtained from KnowledgePanel recruitment data, as this measure was not obtained in the CPS.

Measures

Adolescent attitudes toward climate-friendly behaviors and policies was a composite index of how important adolescents thought it was to engage in 11 mitigation behaviors (such as turning off lights when not needed and walking or biking instead of driving) and how supportive they would be of government policy on climate change (including signing international treaties, priorities that the US president and Congress should give to global warming and to developing clean energy). Missing values were estimated using mean imputation. Responses were coded on 4-point Likert scales, and averaged ($\alpha = 0.94$). (See Appendix 1 for the exact wording on all measures.)

Perceived risk was a scale created from the mean of eight questions that asked respondents how much they thought global warming would harm different individuals or groups (e.g., themselves, their family, future generations) on a 4-point Likert scale, ranging from “not at all” (coded as 1) to “a great deal” (coded as 4); “don't know” responses were recoded as missing, and missing values were estimated using mean imputation (adult $\alpha = 0.97$; youth $\alpha = 0.95$).

Efficacy beliefs were conceptualized as response efficacy, i.e., the effectiveness of specific human activities to mitigate climate change. Adults and adolescents were asked (1) how much: their conservation behaviors would reduce their personal contribution to global warming, and (2) how much the engagement of most people in the U.S. in these behaviors

would reduce global warming. Missing values were estimated using mean imputation. They were averaged into an index for adults ($\alpha = 0.79$) and youth ($\alpha = 0.75$).

The four **RPA framework groups** were formed through median splits of both the risk perception and efficacy belief scores (in which median values were calculated separately for the two data waves). This resulted in four RPA framework groups: indifference (low risk, weak efficacy), proactive (low risk, strong efficacy), avoidance (high risk, weak efficacy), and responsive (high risk, strong efficacy).

Family global warming communication was assessed by asking adolescents and their parents how often they discussed global warming with each other, using 4-point scales ranging from “never” to “often.” Missing values were estimated using mean imputation. The two items were averaged ($\alpha = 0.75$).

Adolescent information-seeking consisted of four questions that assessed how much adolescents engaged in behaviors to seek information on climate change, science, technology and the environment. Missing values were estimated using mean imputation. All responses, coded on 4-point scales (with higher values representing greater information-seeking), were averaged into an index ($\alpha = 0.78$).

Statistical analysis

Pairwise correlation coefficients were generated to examine the associations between adolescent and household demographic variables, information-seeking, attitudes, risk perceptions, efficacy beliefs, and the risk \times efficacy interaction term. Correspondence between parent and adolescent RPA group membership overall and stratified by level of global warming communication was assessed using a χ^2 test. A series of multivariate linear regression models were used to assess the relationships between the dependent variable of adolescent information-seeking and the independent variables of demographics and adolescent attitudes (model 1), adolescent RPA framework groups (model 2), parental RPA framework groups (model 3), and parent-adolescent communication about global warming (model 4). Variance inflation factors showed no multi-collinearity in the models.

Results

Preliminary Analyses

A total of 523 parent-adolescent dyads participated in the study; mean (SD) ages were 43.9 (7.5) and 15.0 (1.3) years, respectively (Table 1). Approximately half were female, and most were non-Hispanic White, Christian, and resided in the central US. The majority of parents (58.5%) had at least some college and an annual income \geq \$50,000 (60.8%). The study population represented a range of political affiliations; most parents were either Democrats or Republicans (61.6%), and most adolescents were unaffiliated, not interested in politics, or other (42.1%).

Table 2 shows the zero-order correlations among study variables. Demographics were weakly associated with the psychosocial variables. Younger adolescents held more positive attitudes toward climate-friendly behaviors and policies ($r = -.11, p < .05$) and higher efficacy beliefs ($r = -.10, p < .05$) than older adolescents. Adolescents whose parents had higher education discussed global warming more often ($r = .13, p < .001$) and engaged in more information-seeking ($r = .11, p < .05$) than those with lower education.

Adolescents' climate-friendly attitudes were positively associated with perceived risk ($r = .39, p < .001$), response efficacy ($r = .50, p < .001$), the risk \times efficacy interaction ($r = .49, p < .001$), and family communication ($r = .22, p < .001$). Adolescents' efficacy beliefs and

perceived risk were positively correlated with each other ($r = .44$, $p < .001$) as well as with the risk \times efficacy interaction ($r = .71$, $p < .001$, and $r = .91$, $p < .001$, respectively). The positive correlation between risk perceptions and efficacy beliefs indicates that more adolescents will be in the indifference and responsive groups than the proactive and defensive groups. Family communication about global warming was positively correlated with adolescents' efficacy beliefs ($r = .13$, $p < .01$), risk perceptions ($r = .26$, $p < .001$), and the interaction of risk and efficacy ($r = .24$, $p < .001$). Information-seeking behaviors were positively associated with climate-friendly attitudes ($r = .27$, $p < .001$), risk perception ($r = .41$, $p < .001$), response efficacy beliefs ($r = .27$, $p < .001$), the risk \times efficacy interaction ($r = .42$, $p < .001$), and family communication about global warming ($r = .42$, $p < .001$).

Hypothesis 1

The first hypothesis pertained to the relationship between parental and adolescent membership in the four RPA framework groups. The proportions of parents and adolescents in each of the four RPA groups were highly similar, illustrating the same correlation between risk perceptions and response efficacy among parents as among the adolescents (Table 3). Approximately one third of the parents and adolescents fell into the indifference groups, and another third into the responsive groups. The remaining third were divided between the proactive and avoidance groups.

Results of the cross-tabulation of the parental and adolescent RPA framework groups are shown in Table 4. Parents' RPA framework group membership was significantly associated with adolescents' RPA framework group membership ($\chi^2 [9, 523] = 125.45$, $p < .001$), thus supporting Hypothesis 1. The highest levels of correspondence between parents and adolescents were for the indifference (low risk, weak efficacy) and responsive (high risk, strong efficacy) groups; 60.2% of responsive parents and 59.2% of indifferent parents had children who shared their views. Correspondence between parents and adolescents for the other two groups (proactive and avoidance) were significantly lower. Proactive parents were most likely to have indifferent adolescents, while avoidance parents were most likely to have responsive adolescents. Overall correspondence between parental and adolescent groups was 49.5 percent.

Because family communication on the issue of global warming is likely to facilitate sharing risk and efficacy beliefs, parent/child RPA correspondence was examined by level of communication about global warming. As shown in Table 5, correspondence is much higher when accounting for family communication. In families that often or occasionally discuss global warming, 67.5 percent of adolescents match their parents' RPA group, compared to 41.3 percent in families that discuss global warming never or rarely. Indifference and responsive parents have the highest correspondence with adolescents at every level of family communication.

Hypothesis 2

Our second hypothesis predicted that, controlling for demographics and climate-friendly attitudes, parental and adolescent RPA group membership and family communication would predict adolescents' information-seeking. Results of the regression equations are shown in Table 6. The first model examined the association between adolescent information-seeking and demographics and adolescents' climate-friendly attitudes, and explained 8% of the variance in information-seeking. Adolescents with more educated parents and those with more positive attitudes were more likely to seek information than adolescents with less educated parents ($\beta = .04$, $p < .05$) and with fewer climate-friendly attitudes ($\beta = .24$, $p < .001$).

Adding the adolescents' RPA group membership to the model (Model 2) increases the amount of variance explained by another 7.4% (to 15.6%). The proactive and avoidance adolescent groups were not significantly different from the indifference group, but the responsive group was significantly more likely to seek information ($\beta = .43, p < 0.001$). Hypothesis 2A was thus supported.

Parental RPA group membership was more weakly associated with adolescent information-seeking, explaining an additional 3 percent of the variance in information-seeking (Model 3). Adolescents from households with parents belonging to the avoidance group or the responsive group were significantly less likely to seek climate change related information than those from the indifference group ($\beta = -.20, p < .05$, and $\beta = -.17, p < .05$, respectively). Adolescents from households with parents belonging to the proactive group were not statistically different from adolescents from households with parents belonging to the indifference group in their propensity to seek information. Hypothesis 2B thus receives only partial support.

In the full model (Model 4), the inclusion of family communication as an independent variable explains 28.2 percent of the variance in adolescents' climate change information-seeking behaviors. Information-seeking remains positively associated with climate-friendly attitudes and the responsive adolescent group, as well as negatively associated with the parent avoidance and responsive groups. Moreover, adolescents are more likely to seek information about climate change when family communication about global warming is frequent than when it is infrequent ($\beta = .31, p < .001$). Thus, hypothesis 2C is strongly supported.

Discussion

The primary purpose of this article was to determine whether adolescents' risk perceptions and efficacy beliefs could be used to predict their information-seeking behaviors pertaining to climate change. We also sought to extend the purview of the risk perception attitude (RPA) framework in several ways: by linking RPA group membership between parents and adolescents; by testing its central propositions in a yet untested behavioral domain, namely information-seeking on climate change issues; and by classifying RPA groups based on the concept of response efficacy, rather than self-efficacy.

Understanding and changing behavior is a central focus within the field of health communication (Parrott, 2008), and human behavior is an important factor in climate change (Kreps & Maibach, 2008). Information-seeking, of course, is but one indicator of adolescents' involvement or engagement in climate change. The extent to which it actually acts as a proxy for or leads to changes in behaviors remains to be seen. Nevertheless, it is a worthwhile effort to motivate adolescents to seek information on their own. Data from large-scale public health interventions, including the Stanford Five-City Project (Winkleby, Flora, & Kraemer, 1994) and the Minnesota Heart Health Program (Viswanath & Finnegan, 1996), indicate not only that people's information-seeking motivations can be significantly improved, but also that increases in information-seeking behaviors are positively associated with the durability of intervention effects (Rimal, Flora, & Schooler, 1999).

Information-seeking may also indicate contemplation to change a behavior. People who seek information on their own may be concerned that choosing wrongly will have negative consequences or they may be looking for effective actions they can take. Our findings indicate that adolescents who perceive high risks from climate change are more likely to seek information than those with lower risk beliefs. This finding points to the importance of

clarifying adolescents' understanding of the link between human behavior and climate change and of emphasizing the effectiveness of conservation behaviors and policies.

Our findings lend credence to the idea that campaigns can segment adolescents according to their risk perceptions and efficacy beliefs. The high information-seeking behaviors exhibited by the responsive group indicate that, by increasing perceived risk and coupling it with messages to increase efficacy, campaigns can increase adolescents' motivations for action. This has implications for social marketing campaigns that segment audiences according to their demographic, psychographic, or behavioral profile. It indicates, for example, that delineating audiences on the basis of their risk perceptions and efficacy beliefs is a meaningful approach, particularly given the differential information-seeking behaviors of the four RPA groups. Furthermore, knowing the target audience's risk and efficacy profile can assist interventions to tailor messages according to what is lacking. For example, audience members lacking in efficacy can be targeted with information about how to overcome barriers to action, what actions provide the greatest impact, etc. Similarly, those with low risk perceptions can be targeted with information explaining the current or projected impacts of climate change on local health and safety.

An important component of a social marketing strategy might be the promotion of a personal identity more closely aligned with pro-environmental attitudes (Peattie & Peattie, 2009). Another strategy could be to link personal actions (e.g., consumption) with environmental risks and the identification of behaviors that are both actionable and effective in ameliorating climate change.

This study also illustrates the role that parents can play in adolescents' engagement in the issue of climate change. We found that adolescents' perceptions of risk and efficacy closely mirrored those of their parents. In particular, parents classified in the indifference (low risk, weak efficacy) and responsive (high risk, high efficacy) groups were significantly more likely to have adolescents belonging to the same groups. Given the cross-sectional nature of the data, we are unable to tell whether parental beliefs drive or are reflective of adolescents' beliefs. Nevertheless, family socialization (Tinsley, 1992) and observational learning (Bandura, 1986) perspectives both argue that parental beliefs precede those of their children – that they raise children in accordance with their own attitudes and beliefs and that children model and subsequently internalize what they observe in the home. Longitudinal data on political socialization processes strongly support this notion (Jennings, Stoker, & Bowers, 2009). This body of work suggests that changing adolescents' behaviors requires parents to play an active role in that process. Adolescence is often thought to be a period characterized by rebellion against parental authority, which raises the possibility of attenuated associations between parental and adolescent attitudes and behaviors. Empirical evidence indicates, however, that this is by far the exception rather than the norm (Smetana, 1996).

A growing body of work adopting the family systems theory (FST) perspective (Beavers & Hampson, 1990; Broderick, 1993) argues that, in order to bring about positive behavioral change, the focus should be on the *relationship* between parents and their children (Kitzman-Ulrich et al., 2010), and this approach highlights concepts such as family cohesion (McFarlane et al., 1995) and connectedness (DeVore and Ginsburg, 2005). Findings from our study indicate that correspondence (or lack thereof) in risk perceptions and efficacy beliefs between parents and their children may be a fruitful starting point for promoting greater information-seeking on climate change.

Finally, it is also worth noting that, in our analyses, we did not observe significant associations between information-seeking, on the one hand, and most of the key demographic factors such as gender and family income, on the other hand. The key

associations were psychosocial in nature. Those with positive attitudes toward environmental issues, high risk perceptions and high response efficacy were more likely to seek information about the environment, regardless of their family background or demographics. From an audience segmentation perspective, this indicates that a focus on psychosocial factors, more than on demographic indicators, is likely to bear more fruit in promoting the adoption of behaviors that promote environmental sustainability.

Limitations

The primary limitation of this article is the cross-sectional nature of the data. We are unable to tell whether high-risk perceptions and strong efficacy beliefs are characteristics of adolescents who are already willing to seek information about climate change or these perceptions drive information-seeking behaviors. There is, however, evidence from studies that have manipulated risk perceptions and efficacy beliefs to indicate that the latter explanation is theoretically sound (Turner et al., 2006).

Another limitation of this study pertains to the fact that all information-seeking behaviors are based on adolescents' self-reports. We do not know the extent to which they reflect actual behaviors, and we suspect that some of the responses may be driven by social desirability biases. Nevertheless, in the absence of reason to believe that such biases operate with different intensities across the four RPA groups, our findings provide us with confidence that risk perceptions and efficacy beliefs are important motivators and facilitators of behavior change.

Finally, we should note that the operationalization of efficacy beliefs in this paper focuses exclusively on response efficacy (belief that a particular action will result in a particular outcome), without taking into account the role of self-efficacy (people's confidence in their ability to take appropriate action). This may explain why some of the findings reported in this paper differ from those observed in other RPA framework-based studies. Future research should explore this issue further.

Conclusion

This paper demonstrates that, at the household level, parental risk and efficacy perceptions are significantly associated with their adolescent children's perceptions. Furthermore, adolescents' propensity to seek information about climate change is associated with their own risk perceptions and response efficacy. The responsive group, who recognize both the dangers of climate change and the potential for action to reduce the threat, is the group with the highest motivation to seek information on the issue. Conversely, adolescents who live with parents who recognize the dangers, but may or may not recognize the potential for reducing it, are less likely to seek information on the issue. This finding suggests that their parents have encouraged (intentionally or unintentionally) an attitude of avoidance concerning climate change among their children.

Overall, the study shows that segmenting adolescents in terms of their risk perceptions and efficacy beliefs can inform strategies to promote information-seeking. This is the first study that has mapped the link between parent- and child-level risk perceptions and efficacy beliefs with regard to information-seeking behaviors. We based the research hypotheses on three important processes of family dynamics: facilitation (whereby, parental behaviors facilitate the enactment of similar behaviors among children), socialization (through which parents transmit value structures to their children), and modeling (by which parents demonstrate to their children how to behave through their own actions). We do not know, because this research was not equipped to test, which of the three processes has the greatest impact on parent-child associations in the home. Nevertheless, it seems clear that

interventions to promote environmentally friendly behaviors should conceptualize the family as a meaningful unit for behavior change.

Finally, perhaps the most significant implication of our findings is the possibility that climate change-related interventions can maximize their impact by conceptualizing the family as the significant unit of intervention. The correspondence between teen and parental outlooks found in this study suggests that, from a social marketing perspective, the meaningful variance may be found between, as opposed to within, families. Interventions can craft messages that speak to each of the four RPA framework groups formulated at the household level, taking into consideration the overall family dynamics in terms of their collective risk perceptions and efficacy beliefs.

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Appendix 1. Variable Measures

Adolescent Attitudes toward Global Warming Mitigation Actions & Policies

How important do you feel it is to take the following actions? (*4-point Likert scales: (1) “not at all important” (2) “somewhat unimportant” (3) “somewhat important” (4) “very important”*)

1. Turn off the lights when they are not needed
2. Turn off electronics, like TVs and computers, when theyre not being used
3. Unplug electronics or turn off their power strips and surge protectors when theyre not being used
4. In the winter, wear warmer clothes instead of turning on the heat
5. In the summer, wear cooler clothes instead of using as much air conditioning
6. Walk or bike, instead of driving
7. Take public transportation or carpool
8. Recycle everything possible at home
9. Carry your own re-usable beverage container
10. Use as little water as possible, for example, when you shower, brush your teeth, and wash dishes.
11. Reduce on the amount of trash and garbage you create.
12. Do you think global warming should be a low, medium, high, or very high priority for the president and Congress? (*4-point Likert scale: (1) “low” (2) “medium” (3) “high” (4) “very high”*)
13. Do you think that developing sources of clean energy should be a low, medium, high, or very high priority for the president and Congress? (*4-point Likert scale: (1) “low” (2) “medium” (3) “high” (4) “very high”*)
14. How much do you support or oppose the following policy: Sign an international treaty that requires the United States to cut its emissions of carbon dioxide 90% by the year 2050. (*4-point Likert scale: (1) “strongly oppose” (2) “somewhat oppose” (3) “somewhat support” (4) strongly support*)

Parent and Adolescent Risk Perceptions

How much do you think global warming will harm...

(*5-point Likert scale: (0) “don’t know” (1) “not at all” (2) “only a little” (3) “a moderate amount” (4) “a great deal”*)

1. You personally

2. Your family
3. People in your community
4. People in the United States
5. People in other modern industrialized countries (like England, Japan and Germany)*
6. People in developing countries (like India, Kenya and Brazil)*
7. Future generations of people
8. Plant and animal species

*The examples in parentheses were included in the adolescent survey, but not in the parent survey.

Parent and Adolescent Efficacy Perceptions

1. Think back to the energy-saving actions you're already doing and those you'd like to do over the next 12 months. If you did most of these things, how much do you think it would reduce your personal contribution to global warming? (*4-point Likert scale: (1) "not at all" (2) "a little" (3) "some" (4) "a lot"*)
2. If most people in the United States did these same actions, how much would it reduce global warming? (*4-point Likert scale: (1) "not at all" (2) "a little" (3) "some" (4) "a lot"*)

Family Global Warming Communication

1. How often do you discuss global warming with your children*? (*4-point Likert scale: (1) "never" (2) "rarely" (3) "occasionally" (4) "often"*)

*"Parents" in the adolescent survey

Adolescent Information Seeking

1. How much attention do you pay to information about global warming? (*4-point Likert scale: (1) "none" (2) "a little" (3) "some" (4) "a lot"*)
2. In the past 30 days, how much have you actively looked for information about global warming? (*4-point Likert scale: (1) "none" (2) "a little" (3) "some" (4) "a lot"*)

How closely do you follow news about each of the following? (*4-point Likert scale: (1) "not at all" (2) "a little" (3) "somewhat closely" (4) "very closely"*)

3. The environment
4. Science and technology

Table 1Characteristics of Parent-Adolescent Dyads (N =523 pairs^a)

		Parents	Adolescents
Age (years), mean ± SD		43.9 ± 7.5	15.0 ± 1.3
Female, %		50.7	48.0
Non-Hispanic White, %		67.5	82.9
Parental education, %	Less than high school	11.7	-
	High school completed	29.8	-
	Some college	29.1	-
	Bachelor's degree or higher	29.4	-
Annual household income, %	<\$50,000		39.2
	\$50,000 – \$84,999		27.7
	\$85,000		33.1
Political affiliations, %	Republican	30.9	23.3
	Democrat	30.7	20.7
	Independent	23.5	13.9
	Other/No affiliation/Not interested in politics	14.8	42.1
Religion, %	Baptist	16.6	15.5
	Protestant	15.9	16.5
	Catholic	24.8	24.3
	Jewish	2.1	1.8
	Other Christian	24.4	22.7
	Other non-Christian	2.3	2.9
	None	13.9	16.3
Geographical region, %	East Coast		34.8
	Central		51.9
	West Coast		13.3

^aDue to missing values, sample size for adults ranged from 514 – 523 and for youth 384 – 523.

Table 2

Correlations among Adolescent and Household Factors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Age	1.00									
2. Female gender	.02	1.00								
3. Parental education	-.03	-.05	1.00							
4. Household income	.03	-.01	.45***	1.00						
5. Attitudes	-.11*	.08	.03	.03	1.00					
6. Risk perception	-.02	-.01	.02	.01	.39***	1.00				
7. Response efficacy beliefs	-.10*	-.02	.03	-.04	.50***	.44***	1.00			
8. Risk × efficacy	-.05	-.00	.05	-.01	.49***	.91***	.71***	1.00		
9. Family communication about global warming	.02	.05	.13**	.03	.22***	.26***	.13**	.24***	1.00	
10. Information seeking	.05	.01	.11*	.03	.27***	.41***	.27***	.42***	.42***	1.00

Note. N = 523 pairs

* p<.05,

**

p<.01,

*** p<.001

Table 3

Proportions of Parents and Adolescents in the RPA Framework Categories

	Parents	Adolescents
Indifference	33.3%	34.8%
Proactive	14.5%	18.2%
Avoidance	12.8%	9.2%
Responsive	39.4%	37.8%
<i>N</i>	523	523

Table 4

Correspondence between Parental and Adolescent Membership in the RPA Framework Categories (N = 523 pairs)

Parental Groups	Adolescent Groups			
	Indifference	Proactive	Avoidance	Responsive
Indifference				
Low risk, weak efficacy	59.2%	18.4%	4.6%	17.8%
Proactive				
Low risk, strong efficacy	43.4%	23.7%	7.9%	25.0%
Avoidance				
High risk, weak efficacy	17.9%	25.4%	20.9%	35.8%
Responsive				
High risk, strong efficacy	16.5%	13.6%	9.7%	60.2%

Note: Percentages are calculated with parental group membership as the reference. Diagonal entries (in bold) correspond to percentage of adolescents in the same group as their parents. Overall correspondence between parental and adolescent groups was 49.5 percent.

$\chi^2 = 125.45, p < .001$.

Table 5

Correspondence between Parental and Adolescent Membership in the RPA Framework Categories by Level of Family Global Warming Communication

Parental Groups	Adolescent Groups			
	Indifference	Proactive	Avoidance	Responsive
High Global Warming Communication^{a,b}				
Indifference				
Low risk, weak efficacy	69.0%	20.7%	0%	10.3%
Proactive				
Low risk, strong efficacy	25.0%	50.0%	12.5%	12.5%
Avoidance				
High risk, weak efficacy	17.6%	17.6%	17.7%	47.1%
Responsive				
High risk, strong efficacy	8.2%	11.0%	11.0%	69.8%
$\chi^2 = 60.35, p < .001$				
Low Global Warming Communication^{a,c}				
Indifference				
Low risk, weak efficacy	57.2%	17.9%	5.5%	19.3%
Proactive				
Low risk, strong efficacy	45.6%	20.6%	7.3%	26.5%
Avoidance				
High risk, weak efficacy	18.0%	28.0%	22.0%	32.0%
Responsive				
High risk, strong efficacy	21.1%	15.0%	9.0%	54.9%
$\chi^2 = 72.63, p < .001$				

Note Percentages are calculated with parental group membership as the reference. Diagonal entries (in bold) correspond to percentage of adolescents in the same group as their parents. Overall correspondence between parental and adolescent groups was 67.5% for high communication and 41.3% for low communication.

^aLow global warming communication was defined as discussing global warming with each other “never” or “rarely” and high global warming communication was defined as “occasionally” or “often.”

^b $N = 127$ pairs.

^c $N = 396$ pairs.

Table 6

Risk Perception Attitude (RPA) Framework as a Predictor of Adolescent Information Seeking (N=522 parent-adolescent pairs)

	DV=Adolescents' Information Seeking			
	Model 1	Model 2	Model 3	Model 4
Adolescent age (years)	.05	.04	.04	.04
Female	-.02	-.01	-.02	-.04
Parental education	.04*	.04*	.04*	.02
Household income	-.00	-.00	-.00	-.00
Adolescent attitudes	.24***	.13*	.14*	.10**
Adolescent RPA groups				
Indifference (reference)		--	--	--
Proactive		-.01	.02	.04
Avoidance		.16	.23*	.21*
Responsive		.43***	.50***	.47***
Parent RPA groups				
Indifference (reference)			--	--
Proactive			-.13	-.01
Avoidance			-.20*	-.18*
Responsive			-.17*	-.24***
Family global warming communication				.31***
Adjusted R ²	.082	.156	.181	.282
F	10.38***	13.07***	10.28***	18.08***

Note. N = 523 parent-adolescent pairs. RPA = risk perception attitude.

* p<.05,

**

p<.01,

p<.001