Personal and social factors that influence pro-environmental concern and behavior: A review

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Abstract

We review the personal and social influences on pro-environmental concern and behavior, with an emphasis on recent research. The number of these influences suggests that understanding pro-environmental concern and behavior is far more complex than the attractive simplicity of several prominent models suggests. The influences are grouped into 17 categories: childhood experience, knowledge and education, personality, sense of control, values, political and world views, felt responsibility, place attachment, norms, age, gender, social class, chosen activities, religion, urban-rural differences, proximity to problematic environmental sites, and cultural and ethnic variations. Beyond these factors, we recognize that pro-environmental behavior is often undertaken based on none of the above influences, but because individuals have non-environmental goals such as to save money or to improve their health and therefore, like honeybees pollinating fruit trees, aid the environment while fulfilling other goals. Finally, these outcomes that are so crucial for humans and other living things undoubtedly are multiply determined by combinations of influences from the 17 categories. A primary goal of researchers now should be to learn more about how these many influences moderate and mediate one another.

Personal and social factors that influence pro-environmental concern and behavior

Many voices have called for changes in human behavior, changes that would harm the environment less. Collectively, we humans have had an enormous impact on the land, water, and air of the planet, far out of proportion to our role as merely one species out of millions. We have massively shaped the planet to suit our comfort and perceived needs, using our outstanding technical abilities and dexterity. In doing so, we have very heavily exploited many of the world's natural resources, pushed aside other species, and left the by-products of our efforts to improve our lifestyles in pools, pits, oceans, lakes, rivers, and landfills around the world, on the highest mountains, and in the air. And this trend is increasing.

Many possible solutions for changing this behavioral direction have been proposed, including a variety of theories, policies, and interventions (e.g., Abrahamse, Steg, Vlek, & Rothengatter, 2005; Swim et al., 2011). Several attempts have been made to describe the categories of factors that result in pro-environmental behavior or the lack of it. These attempts include visualizing the problem at the macro scale and therefore include such non-psychological factors as geophysical conditions and political influences (Gifford, 2006; 2008).

At the meso scale, which focuses on psychological influences, the values-beliefs-norm model (Stern, 2000), the theory of planned behavior (Ajzen, 1991), norm activation theory (Schwartz, 1977), and the focus theory of normative conduct (Cialdini, Reno, & Kallgren, 1990) have been proposed as succinct models of pro-environmental concern and behavior. Yet many studies have shown that the elements of these models could be expanded to include other personal and social factors (e.g., Chen, & Tung, 2010; Heath & Gifford, 2002; Hinds & Sparks, 2008; Raymond, Brown, & Robinson, 2011).

At the same time, self-reported concern often does not translate to objective pro-environmental behavior; the correlation has been estimated in one meta-analysis to be about .45 (Kormos & Gifford, submitted). This occurs partly because as many as 30 barriers to behavior change have been described (Gifford, 2011). Humans are an extremely protean species. Succinct or "shorthand" theories and models may help to capture important portions of the variability in environmental concern and pro-environmental behavior, but a full account inevitably must include a broad range of personal and social influences. To that end, this article summarizes many of the personal and social influences on whether a given person will tend to have concern about the environment or act in pro-environmental ways. It cannot summarize all the efforts; 25 years ago, over 300 relevant studies were gathered in a meta-analysis by Hines, Hungerford and Tomera (1986-87), and many more studies have been conducted since then. Rather, we hope to provide a reasonable, selective guide to the personal and social influences.

These influences on environmental concern and behavior include childhood experience, knowledge and education, personality, sense of control, values, political and world views, felt responsibility, place attachment, norms, age, gender, social class, chosen activities, religion, urban-rural differences, proximity to problematic environmental sites, and cultural and ethnic variations. We consider each of these in turn next.

Childhood Experience

Childhood experiences may account in part for environmental concern. When over 200 environmental educators from around the world were surveyed, the strongest predictor of environmental concern was the amount of outdoor experience they had as children (Palmer, 1993). Not surprisingly, children who talk about the environment at home, watch nature films, and read about the environment are more concerned (Eagles & Demare, 1999).

Knowledge and Education

One is unlikely to knowingly be concerned about the environment or deliberately act in pro-environmental ways if one knows nothing about the problem or potential positive actions. These two factors were among the strongest predictors of responsible environmental behavior in Hines, Hungerford, and Tomera's (1986-87) classic meta-analysis of 315 studies. A British study found that the best discriminator between environmentally concerned and indifferent teens was the amount of environmental knowledge about specific issues they claimed to have, although concerned teens also had more scientific knowledge than unconcerned teens (Lyons & Breakwell, 1994).

A recent summary of 15 knowledge surveys in the US (Robelia & Murphy, 2012) found a very high level of knowledge about some environmental problems (e.g., what renewable resources are, where garbage goes, what causes habitat destruction), but "discouraging" levels of knowledge about others (e.g., climate change, energy production, and water quality). As the authors say, making informed pro-environmental choices is difficult if one has incorrect or no knowledge. Fortunately, correct knowledge has been shown to predict behavior (e.g., Levine & Strube, 2012), although knowledge must be regarded as a necessary but a sufficient condition for salutary decision-making. Even self-reported knowledge, fallible as it may be, seems to predict more pro-environmental behavior (Fielding & Head, 2012).

Education is also important. Individuals with more education in general are more concerned about the environment (Arcury & Christianson, 1993; Chanda, 1999; Hsu & Rothe, 1996; Klineberg, McKeever, & Rothenbach, 1998; Ostman & Parker, 1987), although a study in Norway found the opposite (Grendstad & Wollebaek, 1998). More specifically, however, business (Synodinos, 1990) and technology (McKnight, 1991) majors are less concerned than

students in other disciplines (Tikka, Kuitnen, & Tynys, 2000). Students enrolled in a university environmental education (EE) program have significantly greater environmental knowledge, verbal commitment, and actual commitment than similar students who are not enrolled in (Gifford, Hay, & Boros, 1982–83), although it may be that students in EE programs had more environmental concern before they entered the EE program (Reid & Sa'di, 1997); EE programs may not necessarily increase environmental attitudes.

Personality

The Big Five personality factors (Costa & McCrae, 1992) currently are considered to represent much of the normal personality domain. They include openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability. Openness (the degree of intellectual curiosity, creativity and a preference for novelty and variety) has been related to more pro-environmental activities (Fraj & Martinez, 2006). In a related study, openness was related to more-frequent pro-environmental behaviors in both a community sample and an undergraduate student sample, but also that this relation was fully mediated by environmental attitudes and connection to nature (Markowitz, Goldberg, Ashton, & Lee, 2012).

In a study of Germans, greater environmental concern was related not only to greater openness, but also to greater agreeableness (the tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others; Hirsh, 2010). To a lesser extent, increased environmental concern was also related to less emotional stability (the tendency to experience unpleasant emotions such as anger, anxiety, depression, or vulnerability less) and more conscientiousness (the tendency to show self-discipline, act dutifully, and aim for achievement; planned rather than spontaneous behavior; organized, and dependable). The perhaps-surprising relation between emotional instability and environmental concern may be explained by the

tendency of people with lower levels of emotional stability to be worried about many aspects of life, among which are environmental issues.

Openness, agreeableness, and conscientiousness were strongly linked to environmental engagement across both persons and nations in a wide-ranging set of studies (Milfont & Sibley, 2012). Agreeableness and conscientiousness also seem to be positively related to recycling behaviors (Swami, Chamorro-Premuzic, Snelgar, & Furnham, 2011).

A less-studied trait is future orientation (or consideration of future consequences), the tendency to establish and achieve goals and to plan strategies for meeting long-term obligations (Corral-Verdugo, & Pinheiro, 2006). It is consistently and positively related to sustainable behaviors, including water conservation (Corral-Verdugo & Pinheiro, 2006), choice of public transport (Joireman, Van Lange & Van Vugt, 2004), consumption behaviors, and pro-environmental intentions (Urien & Kilbourne, 2011).

Sense of Control

Locus of control is a trait-like tendency that refers to the extent to which people attribute control over events in life more to themselves or more to external sources (Rotter, 1966). Those who believe that events or life-outcomes are controlled by their own behavior or personal characteristics are said to have an internal locus of control; in contrast, people who tend to ascribe responsibility for things that happen to them to factors beyond their own control, such as powerful others, chance, or fate, are said to have an external locus of control (Levenson, 1973, 1974; Rotter, 1966). Presumably, individuals with an internal locus of control actively seek out information, including about environmental problems. If so, they will more often acquire, and make better use of, knowledge that is conducive to behaving in an environment-friendly manner than those who attribute control to external sources. Indeed, internal locus of control has been associated with greater willingness to purchase ecological products (Schwepker & Cornwell,

1991) and to stronger pro-environmental intentions and behavior (Ando, Ohnuma, Blöbaum, Matthies, & Sugiura, 2010; Fielding & Head, 2012), including the use of cars for commuting (Abrahamse, Steg, Gifford, & Vlek, 2009). Locus of control also seems to moderate the link between values and pro-environmental behavior (Enqvist Jonsson & Nilsson, in press). In order for values to be expressed in pro-environmental behavior, it seems to be important that people perceive their events to be controlled by their own behavior or personal characteristics, i.e. internal locus of control. Moreover, this is more important for people with a low degree of self-transcendence values than for those who strongly prioritize self-transcendence values.

A similar trait-like concept is self-efficacy, the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations (Bandura, 1977). A sense of self-efficacy facilitates recycling behavior in mainland China (Tang, Chen, & Luo, 2011) and in Spain (Tabernero & Hernández, 2011), Thai consumer behavior (Rice, Wongtrada, & Leelakulthanit, 1996), electricity use among Danish consumers (Thøgersen, & Grønhøj, 2010), various other pro-environmental behaviors (Meinhold & Malkus, 2005; Walton & Austin, 2011), as well as political activism for environmental causes (Lubell, 2002).

Values, Political Views, and Worldviews

Values (and related concepts that are relatively stable within a person) are strongly related to environmental attitudes (Schultz & Zelezny, 1999). Not surprisingly, persons who hold more altruistic and biospheric values report being more environmentally concerned (Milfont & Gouveia, 2006). Individuals who simply have stronger value orientations, are more people-oriented, less authoritarian (Schultz & Stone, 1994), have higher levels of moral development (Swearingen, 1990), and believe their actions will make a difference (Axelrod & Lehman, 1993) tend to be more environmentally concerned. Younger people are less ecocentric than older people, at least in some samples (Grendstad & Wollebaek, 1998).

An Australian study reports that committed environmentalists have more secular and post-materialist values (McAllister & Studlar, 1999). Post-materialistic values seem positively related to environmental concern; in turn, environmental concern, perceived threat, and perceived behavioral control apparently predict willingness to sacrifice, which then seems to lead to a variety of pro-environmental behaviors (Oreg & Katz-Gerro, 2006).

Post-materialist values typically are held by more affluent citizens who have fewer worries about the basic materials of life; they tend to be concerned with "higher-level" goals and actions such as self-improvement, personal freedom, and providing direct input to government. Among students, holding moral principles is a better predictor of environmental actions, whereas among community residents, tangible possessions (such as material economic rewards) are better predictors of environmental actions (Axelrod & Lehman, 1993). Holding post-materialist values and political competence is related to increased interest in environmental political action (Paloniemi & Vainio, 2011).

Materialists and post-materialists may be concerned about different environmental issues. In Turkey, materialists tend to be more concerned about local environmental issues, whereas post-materialists tend to be more interested in global environmental issues (Göksen, Adaman, & Zenginobuz, 2002). However, post-material values may be less important than other factors, such as whether an actual environmental hazard is nearby (Drori & Yuchtman-Yaar, 2002).

Individuals who believe in free-market principles, that technology will solve environmental problems, and that economics is the best measure of progress tend to have less environmental concern (Heath & Gifford, 2006; Kilbourne, Beckmann, & Thelen 2002). Similarly, Less environmental concern has been reported for individuals with conservative political views (Eiser, Hannover, Mann, Morin et al. 1990; Schultz & Stone, 1994). However, the relation between values and environmental views may not be simple. People have multiple values and they can

conflict. When two values are in conflict, for example, the difference between the preexisting level of endorsement of the two values may predict one's environmental views than the endorsement level of either single value (Howes & Gifford, 2009).

One's views on the "nature of nature" are related to one's environmental concern. Four myths of nature can be distinguished (Adams, 1995). First, those who think of nature as capricious believe that she is capable of anything; nature is unpredictable. Second, those who think of nature as benign believe that she is very capable of adapting; nature can manage to find its equilibrium again even when she is disturbed. Third, those who think of nature as ephemeral believe that she is delicate and fragile; even small disturbances will have drastic consequences. Fourth, those who think of nature as tolerant/perverse believe she is able to absorb some disturbance, but beyond a certain limit, she will suddenly collapse. Those who believe the nature-ephemeral myth are most concerned; those who believe the nature-benign myth are least concerned (Poortinga, Steg, & Vlek, 2003).

People in general believe that threats to the environment are weaker in their local area than in distant places (Gifford et al., 2009), but egalitarians believe this more strongly, and individualists believe it less strongly (Lima & Castro, 2005).

Felt Responsibility

Finally, as one might expect, feeling responsible is an important part of environmental concern (Kaiser, Ranney, Hartig, & Bowler, 1999). This feeling of responsibility apparently stems largely from a sense of guilt (Kaiser & Shimoda, 1999). In a nationwide sample of Dutch teenagers, environmental concern was strongly connected to willingness to make sacrifices, such as financial sacrifices, for the environment (Kuhlemeier, van den Bergh, & Lagerweij, 1999).

Place Attachment

One might expect that if individuals have a strong attachment to a place, they would want to protect it. Evidence supports this proposition (Scannell & Gifford, 2013). For example, when adding place attachment to the standard values-beliefs-norms model doubled the predictability of people's conservation of native plants (Raymond, Brown, & Robinson, 2011). However, place attachment comes in multiple varieties, and not all seem to be related to pro-environmental behavior: natural place attachment but not civic attachment seems to have that connection (Scannell & Gifford, 2010).

Norms

If one believes that the "usual thing to do" is to recycle, one is likely to recycle. This is the heart of norm activation theory (Schwartz, 1977), as adapted for environmental issues, and other norm-oriented approaches. Norm activation theory's main constructs are awareness of need, awareness of consequences, personal norms, and subjective norms. Personal norms represent one's feelings of moral obligation toward taking action, for example, against nuclear energy (de Groot & Steg, 2010), or the intention to reduce one's use of cars (Abrahamse, Steg, Gifford, & Vlek, 2009). Subjective norms represent one's sense that significant others expect a certain pattern of behavior. In a typical study, the model showed that parents can create norms in young children to recycle and the re-use paper (Matthies, Selge, & Klöckner, 2012). The theory's elements seem to be strong predictors of environmental behavior (De Groot & Steg, 2009).

The focus theory of normative conduct (Cialdini, Reno, & Kallgren, 1990) introduced injunctive and descriptive norms in the context of a study of littering. Respectively, they reflect the idea that sometimes group approval is used to encourage people to engage in the "usual" behaviors and sometimes people engage in behavior because they believe that "most people do this" (whether that is objectively true or not).

Yet another type is the local norm, one that derives from people sharing the same physical area; local norms are particularly relevant for behaviors that occur in a specific proximate location (Fornara, Carrus, Passafaro, & Bonnes, 2011).

Age

Early studies (Hines, Hungerford, & Tomera, 1986/87; Roberts, 1993) as well as more recent ones (Gilg, Barr, & Ford, 2005; Pinto, Nique, Añaña, & Herter, 2011) find that older people report more pro-environmental consumer behaviors than younger people. These findings may support the hypothesis that something important happened to an older generation that did not happen to the younger generation. If so, such a cohort effect would not be caused by aging itself, but by events that had a greater impact on one age group than another. This effect seems plausible if it stems from a background of limited resources and the need to conserve in the depression 1930s and wartime 1940s. However, the behaviors measured often are not only conservation behaviors, but include such choices as fairly traded goods and recycled products (Gilg, Barr, & Ford, 2005). This may hint at another hypothesis that is as yet poorly understood.

The picture for environmental *concern*, however, is not the same as that for environmental *behavior*. Most (but not all) research shows that younger people report being more environmentally concerned than older people, at least about the general environment (Arcury & Christianson, 1993; Honnold, 1984–85; Klineberg, McKeever, & Rothenbach, 1998; Zhang, 1993), although why this is so when younger people may be less ecocentric(see above) remains to be discovered. This trend even seems to hold *within* the younger age range; a German study found that 12-year-olds were more concerned than 15- and 18-year-olds (Szagun & Mesenholl, 1993). However, environmental concern is quite variable among older adults, so concluding that all older people are unconcerned would be am obvious mistake (Wright, Caserta, & Lund, 2003).

Apart from the cohort effect, two other possible interpretations of this age-related trend are possible. First, as people age, they may become less concerned about the environment; this would be a true age effect. Second, perhaps the times are changing; that is, if the overall political-social climate is growing more conservative, everyone may be less concerned about the environment than they were earlier. This is an era effect. In a clever study that compared concern across different ages, generations, and eras to answer this question, support appeared for an era effect, although true age effects also appear strong within the young-adult age group (Honnold, 1984–85). However, this study is now almost thirty years old, so a current examination of this issue is needed.

Gender

Early research reviews of gender differences in environmental attitudes and behaviors (Hines, Hungerford, & Tomera,1986–87; Van Liere & Dunlap, 1980) concluded that the literature was inconsistent; that no clear differences could be discerned. However, a clearer—but not entirely uniform--picture seems to have emerged more recently, in which women tend report stronger environmental attitudes, concern, and behaviors than men (Blocker & Eckberg, 1997; Gutteling & Wiegman, 1993; Luchs & Mooradian, 2012; Scannell & Gifford, 2013; Tikka, Kuitnen & Tynys, 2000; Zhang, 1993). Indeed, this gender difference in environmental attitudes and behaviors was also supported across age and across 14 countries and was consistently stronger for behaviors than for environmental attitudes (Zelezny, Chua & Aldrich, 2000). The exceptions to this trend seem to be in China, where the above pattern was observed in domestic environmental behaviors (e.g., recycling), whereas outside the home (e.g., environmental organization donations) no gender differences were exhibited, and women expressed lower levels of concern than men (Xiao & Hong, 2010).

What might explain these differences? Perhaps personality mediates the effect of gender on sustainable consumer behavior (Luchs & Mooradian, 2012). For example, more agreeable consumers are more likely to place importance on social and environmental concerns, a personality trait that is more prominent among women. Similar explanations propose that, compared to males, females have higher levels of socialization to be other-oriented and socially responsible, which may then influence pro-environmental behavior (Zelezny, Chua, & Aldrich, 2000).

Women are more likely to say they are more upset by anti-environmental events and that they intend to do more about the problems, but they seem to have less factual knowledge about environmental problems than men (Arcury & Christianson, 1993; Gambro & Switzky, 1999; Gifford, Hay & Boros, 1982-83; Levine & Strube, 2012). This pattern—that women express more concern, but men are more knowledgeable—has been confirmed in other studies (Arcury, Scollay, & Johnson, 1987; Grieve & Van Staden, 1985; Schahn & Holzer, 1990; Stern, Dietz, & Kalof, 1993). Perhaps this is one result of social and school systems that discourage girls from early interests in science and the environment. This would strongly suggest that educators should pay more attention to the environmental education of girls and women. Another explanation is that altruistic concerns such as health and safety (which can be threatened by a degraded environment) are more important to women, especially to women with children at home (Davidson & Freudenburg, 1996; Dietz, Kalof, & Stern, 2002).

Social Class

Studies that investigate consumer behaviors (Balderjahn, 1988), energy conservation behaviors (Howard, Delgado, Miller & Gubbins, 1993), and curbside recycling (Laidley, 2011), suggest that environmentalists tend to be middle- or upper-middle-class individuals. At the nation level, citizens of richer countries seem on average to have greater environmental concern

(Inglehart, 1995). One such study convincingly demonstrated that environmental concern has a clear positive relationship with GDP per capita (Franzen, 2003).

This may occur because residents of richer than poorer countries prefer general environmental improvement measures to economic growth. At least two main explanations for this may be entertained. First, increased revenue will also increase demand and requirements for a good environment, and then increased economic assets make it easier to allocate resources for improving the environment (Franzen, 2003). The second explanation, advanced in particular by Ingelhart (1997), is that increased wealth and welfare generate a change from materialist to post-materialist values. When people no longer need to devote so much time to meeting their basic material needs, a shift occurs from material values, such as striving for increased income and property, to values that are more strongly linked to self-development and well-being. Within one African country, wealthier persons better recognized environmental issues than poorer persons, although this may be the result of educational differences that stem from wealth differences (Chanda, 1999). An important difference between these two explanations is that in the first case people can be as materialist as they were before, but nevertheless give greater priority to a better environment. In the second case, the increasing concern is the result of a change in values.

However, in apparent contrast to this trend, when industrialized and developing nations were compared, environmental issues were mentioned more frequently than expected in developing countries, and respondents from developing countries expressed higher levels of concern about environmental problems than did respondents from industrialized nations (Dunlap, Gallup & Gallup, 1993). In the same vein, low-income earners were more concerned than higher-income earners (Uyeki & Holland, 2000).

This apparent discrepancy may be resolved by noticing that the former studies related environmental concern to national wealth, whereas the second studies related it to the individual

level of analysis. This explanatory notion is supported by a study which found that economic factors predicted environmental concern at the national level, but not at the individual level (Kemmelmeier & Young, 2002).

Differences in environmental concern by wealth may also depend on global versus local environmental concern (cf. Gifford et al., 2009). Citizens of poorer countries appear to be more concerned about local environmental problems than citizens of wealthy countries, whereas income difference do not account for concern about global environmental problems (Brechin, 1999). This probably occurs because wealthy people have fewer environmental problems in their communities than do poor people. Furthermore, even if environmental actions save money in the long run, wealthier people can more easily afford the initial costs.

Chosen Activities

Environmental concern is associated with one's choice of activities. People who engage in outdoor recreation tend to be concerned about the environment, but this varies with the activity (Teisl & O'Brien, 2003). In general, those who prefer consumptive outdoor activities (e.g., hunting or fishing) tend to be less concerned than people who engage in non-consumptive activities (e.g., hiking, photography; Di Nenna, Paolillo & Giuliani, 1987). Similarly, members of bicycling organizations tend to be more concerned than members of off-road vehicle organizations (Schuett & Ostergren, 2003). Performing ecological restoration work is associated with more positive environmental attitudes and behavior (Bowler, Kaiser, & Hartig, 1999), as is engaging in more nature-related activities in general (Tikka, Kuitnen, & Tynys, 2000).

People who spend more time reading newspapers are more concerned, and those who watch more TV are less concerned and less willing to make sacrifices for the environment (Ostman & Parker, 1987; Shanahan, Morgan, & Stenbjerre, 1997). However, not surprisingly, adolescents who watch more science shows (Eagles & Demare, 1999) and people who watch more news and

nature documentaries are more concerned (Holbert, Kwak & Shah, 2003). Women who engage in more personal health care activities are more concerned (Greenwald, 1993).

Religion

The hypothesis that environmental concern is rooted in religious beliefs and values has been raised by many writers. The traditional view is that the Judeo-Christian religious tradition is a main cause of Western environmental problems (White, 1967). The thesis is that by establishing a dualism between humans and nature, Christianity made it possible to exploit nature while being indifferent to the welfare of nature. The emergence of modern technology is at least partly explained by the Christian dogma of human transcendence of, and rightful mastery over, nature. However, others have made the opposite claim; that the Judeo-Christian tradition contributes to greater pro-environmental behavior because it promotes a stewardship ethic that embodies responsible planning and management of resources (e.g., Naess, 1989; Whitney, 1993).

Empirical research on this issue remains divided and inconclusive. To a large extent, this is a result of differences in ways to measure religiosity and type of environmental concern or behavior. Judeo-Christians have been found to be more committed to mastery over nature orientation and to have less environmental concern than non-Christians (Hand & Van Liere, 1984). Other comparisons between religions report no significant differences between Christians and Jews compared to other religions on environmental concern (Greely 1993; Hayes & Marangudakis, 2001; Kanagy & Nelsen 1995;Wolkomir, Futreal, Wooddrum, & Hoban 1997; Woodrum & Hoban 1994). Some report a negative relation between biblical literalism and environmental concern (Eckberg & Blocker, 1996) and other data support this negative relation between biblical literalism and environmental concern, using data from four national surveys of clergy, religious activists, political-party contributors, and the public (Guth, Green, Kellstedt & Smidt, 1995).

Liberal religious denominations are less likely to emphasize domination of nature; in these denominations, church attendance is positively related to environmental concern, probably because these denominations are more oriented towards a stewardship ethic. Others have reported a positive relation between religious participation and pro-environmental behavior (e.g., Kanagy & Willits, 1993). One interpretation of much of the research (e.g., Biel & Nilsson, 2005; Hand & Van Liere, 1984; Kanagy & Nelsen, 1995; Shaiko, 1987) is that Christian religious beliefs have might have different implications for environmental concern compared to other non-religious motives to act pro-environmentally. These beliefs seem to be more of a stewardship type of concern (a responsibility to maintain and wisely use the gifts that God has given) and subsequently the relationships might not always follow the same pattern as in non-religious groups. For instance, one study found that while there were no differences between Christians and non-Christians on the perception of general environmental threats, the threat of genetically modified crops were judged to be more serious by Christians (Biel & Nilsson, 2005). The use of GMO seems to resonate badly with the stewardship ethic of maintaining, rather than altering, the gifts that god has given.

The stewardship ethic should also apply for Muslims; humans, according to Islam, are merely part of the holistic system of life created by God, and although humans have the right to survive, they have been given the role of responsible leadership on earth (Izzi Dien, 2003). Although empirical studies are few, one study in Egypt found that Islamic religious teachings and religiosity were associated with pro-environmental behavior, thus lending support to the presence of an Islamic environmental ethic (Rice, 2006).

Urban versus Rural Residence

People who live in rural areas experience the environment in very different ways from their urban counterparts; doubtless they are in touch more with nature. Does that result in greater or

lesser environmental concern or behavior? Research from numerous countries has yielded conflicting results. In China, people living in larger cities were more likely to engage in pro-environmental behaviors than people living in smaller cities (Chen, Peterson, Hull, Lu, Lee, Hong, & Liu, 2011). Urban Germans reported greater verbal commitment to environmental issues, but were not different from rural Germans in other forms of concern (Bogner & Wiseman, 1997).

However, students in the UK who had grown up in rural areas report more positive orientations toward the natural environment than urban-raised students (Hinds & Sparks, 2008). Norwegian farmers are less ecocentric (putting nature's interest ahead of humanity's interest) and more anthropocentric (wanting to protect the environment mainly so that it can fulfill human needs) than others (Bjerke & Kaltenborn, 1999). Rural Trinidadians also are more anthropocentric than their urban counterparts (Rauwald & Moore, 2002), and the same is true based on a large national sample in Canada (Huddart-Kennedy, Beckley, McFarlane, & Nadeau, 2009), although rural residents reported higher participation in recycling and stewardship behaviors. The anthropocentric tendencies of rural residents seem consistent with their use of natural resources for human ends. Finally, British Columbia residents reported relatively high levels of environmental concern among both rural and urban dwellers (Lutz, Simpson-Housley, & de Man, 1999).

Proximity to Problem Sites

Although other factors also play a role, people who live closer to a problem site such as a landfill or waste disposal site tend to be more concerned, at least about that environmental problem (Arp & Kenny, 1996; Bassett, Jenkins-Smith, & Silva, 1996; Elliott, Taylor, Walter, Stieb, Frank, & Eyles, 1993). In a southern California study (Baldassare & Katz, 1992), residents who believed that their well-being was more threatened by environmental problems were more

likely to engage in recycling, water conservation, less driving, and purchasing environmentally safer products. Not surprisingly, residents are in favor of reducing greenhouse gas emissions if they believe this will not threaten their own jobs (O'Connor, Bord, Yarnal, & Wiefek, 2002).

Cultural and Ethnic Variations

Many variations in environmental concern among ethnic, racial, and national groups have been reported. Cultures vary not merely in their level of concern, but also in the structure of their thinking *about* concern (Eisler, Eisler & Yoshida, 2003; Zheng & Yoshino, 2003).

Within the United States, early research suggested that environmental concern was lower among African-Americans, but more recent studies show that Afro-Americans have similar (Parker & McDonough, 1999) or even greater (Mohai & Bryant, 1998; Uyeki & Holland, 2000) environmental concern than Euro-Americans. The earlier findings may have stemmed from measurement of environmental activities that were less relevant to African-Americans (Arp & Kenny, 1996).

Immigration can be related to environmental concern. For example, more-acculturated U.S. Latin-Americans appear to be less environmentally concerned than less-acculturated U.S. Latin-Americans (Schultz, Unipan, & Gamba, 2000). However, business students in Chile (who are presumably not acculturated to the U.S.) exhibit more environmental concern and stronger intentions to engage in pro-environmental behavior than U.S. business students (Cordano, Welcomer, Scherer, Pradenas, & Parada, 2010). Another study found that immigrants in general have environmental attitudes that are similar to those of non-immigrants, but that newer immigrants express greater concern than native-born Americans (Hunter, 2000).

In general, citizens of developing countries seem to have as much, or more, environmental concern as those in developed countries (Furman, 1998; Mostafa, 2011). This contrasts with the social class results within societies; perhaps the difference reflects within versus between society

dynamics. In Spain, survey results suggest that environmentalism has become a central element of the Spanish belief system (Herrera, 1992). Chinese teens list environmental pollution and overpopulation as their greatest concerns, even more important than the death of a parent, fear of nuclear war, or getting a good job (Dodds & Lin, 1992). In India, more than three-quarters of the respondents in a large-scale survey said that local air pollution was a major problem (Dietz, Stern, & Guagnano, 1998). Brazilian children, Portuguese children, and U.S. children of the same age are about equally concerned about the environment (Howe, Kahn, & Friedman, 1996; Kahn & Lourenço, 2002).

Thus, in general, environmental concern is important for many people around the world. The issue may be how the *structure* of attitudes in differs from society to society rather than *differences* in level of concern. For example, U.S. residents tend to see environmental issues as humans versus nature, but in Mexico and Brazil residents are more likely to perceive no necessary conflict between development and nature (Bechtel, Verdugo, & Pinheiro, 1999; Corral-Verdugo & Armendariz, 2000;).

Although some observers have portrayed less-developed societies as managing their resources well and as models for modern Western societies to emulate, one researcher concluded from a survey that the low-impact practices of traditional societies may result less from their reverence for the environment than from low population density, inefficient harvest technologies, and a lack of profitable markets for their resources (Low, 1996).

None of the Above

Recently, researchers have discovered what might have been obvious: some people engage in pro-environmental behavior without necessarily having any of its presumed pre-requisites: knowledge, childhood experiences, activity choices, personality, values, norms, perceived behavioral control, or even behavioral intention to do so. How could that be?

Sometimes individuals make behavioral choices that reduce harm to the environment for other reasons. The cycle for their health (Whitmarsh, 2009), they insulate their homes to save money, or they recycle and re-use because they are poor. These individuals have been called "honeybees," because, like that insect, in pursuing a completely different goal, they provide an important side-benefit (Gifford, 2011).

So, What Do We Know?

In short, we know that environmental concern and pro-environmental behavior are influenced by many factors. The models that have been proposed, while well-intentioned, might be characterized as what Gordon Allport (1954) many years ago called "simple and sovereign solutions," that is, gentle language for "too simple-minded." Even without including non-psychological influences such as natural forces, economic factors, technological innovation, or governance instruments, attempting to fully account for variation in environmental concern and pro-environmental behavior is a seriously complex enterprise. This article summarizes, but probably not in a fully exhaustive way, how ten categories of personal and social factors influence these very important outcomes.

The reader who has followed this trail thus far could be forgiven for concluding that the answer to "what influences…" is so multi-faceted as to defy reasonable integration and comprehension. The likely reason for this is that many of the factors influence each other through moderation or mediation. Some overwhelm others in their impact, but those others may appear to have effects if they are considered in isolation.

One approach to untangling these complexities is to undertake a meta-analysis. Two important attempts have been made, and in some ways they come to the same conclusions. The first broad meta-analysis, by Hines, Hungerford, and Tomera (1986-87) considered 315 relevant studies and found that pro-environmental behavior was most strongly predicted by knowledge of

issues, knowledge of action strategies, locus of control, attitudes, verbal commitment, and an individual's sense of responsibility. Twenty years later, a meta-analysis by Bamberg and Möser (2007) agreed for the most part with the earlier one, but also concluded that the intention to engage in pro-environmental behavior mediates the impact of the other personal and social influences, that personal norms influence this intention, and that problem awareness is a significant indirect influence on pro-environmental intention. The impact of the latter, they find, is mediated by moral and social norms, guilt, and attribution processes.

All that being said, we will conclude with a leap of faith and suggest that in broad strokes a person with a particular personal and social profile will be more likely to be concerned about the environment and to act on its behalf. Let us therefore posit that such persons are likely to have spent time in nature as a child, have accurate knowledge of the environment, its problems and potential solutions, to have an open, agreeable, and conscientious personality, to consider the future consequences of their actions, feel in control of their behaviors, harbor biospheric, post-material, liberal values and responsibility for environmental problems, are upper-middle class, hold personal and descriptive norms about pro-environmental action, adhere to a religion that teaches a stewardship orientation to the earth, and spend time in non-consumptive nature activities. Or, they could just be honeybees.

References

Abrahamse, W., Steg, L., Gifford, R., & Vlek, C. (2009). Factors influencing car use and the intention to reduce it: A question of morality? *Transportation Research Part F: Psychology and Behavior, 12,* 317-324.

Abrahamse, W., Steg, L., Vlek, C., & Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology, 25,* 273-291.

Adams, J. (1995). *Risk.* London: Routledge, Taylor, & Francis.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179-211.

Allport, G. W. (1954). The historical background of modern social psychology. In G. Lindzey, (Ed.), *Handbook of social psychology* (Vol. 1, pp. 3-56). Reading, MA: Addison-Wesley.

Ando, K., Ohnuma, S., Blöbaum, A., Matthies, E., & Sugiura, J. (2010). Determinants of individual and collective pro-environmental behaviors: Comparing Germany and Japan. *Journal of Environmental Information Science, 38,* 21-32.

Arcury, T. A., & Christianson, E. H. (1993). Rural-urban differences in environmental knowledge and actions. *Journal of Environmental Education, 25,* 19–25.

Arcury, T. A., Scollay, S. J., & Johnson, T. P. (1987). Sex differences in environmental concern and knowledge: The case of acid rain. *Sex Roles, 16,* 463–472.

Arp, W., & Boekelman, K. (1997). Religiosity: A source of Black environmentalism and empowerment? *Journal of Black Studies, 28,* 255–267. NOT IN TEXT

Arp, W., & Kenny, C. (1996). Black environmentalism in the local community context. *Environment and Behavior, 28,* 267–282.

Axelrod, L. J., & Lehman, D. R. (1993). Responding to environmental concerns: What factors guide individual action? *Journal of Environmental Psychology, 13,* 149–159.

Baldassare, M., & Katz, C. (1992). The personal threat of environmental problems as predictor of environmental practices. *Environment and Behavior, 24,* 602–616.

Balderjahn, I. (1988). Personality variables and environmental attitudes as predictors of ecologically responsible consumption patterns. *Journal of Business Research, 17,* 51–56.

Bamberg, S, & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology, 27,* 14-25.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84,* 191-215.

Bassett, G. W., Jr., Jenkins-Smith, H. C., & Silva, C. (1996). Onsite storage of high level nuclear waste: Attitudes and perceptions of local residents. *Risk Analysis, 16,* 309–319.

Bechtel, R. B., Verdugo, V. C., & Pinheiro, J. D. Q. (1999). Environmental belief systems: United States, Brazil, and Mexico. *Journal of Cross-Cultural Psychology, 30,* 122–128.

Biel, A., & Nilsson, A, (2005). Religious values and environmental concern: Harmony and detachment. *Social Science Quarterly, 86,* 178-191.

Bjerke, T., & Kaltenborn, B. P. (1999). The relationship of ecocentric and anthropocentric motives to attitudes toward large carnivores. *Journal of Environmental Psychology, 19,* 415–421.

Blocker, T. J., & Eckberg, D. L. (1997). Gender and environmentalism: Results from the 1993 General Social Survey. *Social Science Quarterly, 78,* 841–858.

Bogner, F. X , & Wiseman, M (1997). Environmental perception of rural and urban pupils. *Journal of Environmental Psychology,17,* 111–122.

Bowler, P. A., Kaiser, F. G., & Hartig, T. (1999). A role for ecological restoration work in university environmental education. *Journal of Environmental Education, 30*(4), 19-26.

Brechin, S. R. (1999). Objective problems, subjective values, and global environmentalism: Evaluating the postmaterialist argument and challenging a new explanation. *Social Science Quarterly, 80,* 793–809.

Chanda, R. (1999). Correlates and dimensions of environmental quality concern among residents of an African subtropical city: Gaborone, Botswana. *Journal of Environmental Education*, 30, 31–39.

Chen, M-F., & Tung, P-J. (2010). The moderating effect of perceived lack of facilities on consumers' recycling intentions. *Environment and Behavior, 42,* 824-844.

Chen, X., Peterson, M. N., Hull, V., Lu, C., Lee, G. D., Hong, D., & Liu, J. (2011). Effects of attitudinal and sociodemographic factors on pro-environmental behaviour in urban China. *Environmental Conservation, 38*, 45-52. doi: doi:10.1017/S037689291000086X

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology,* 58, 1015-1026.

Cordano, M., Welcomer, S., Scherer, R., Pradenas, L., & Parada, V. (2010). Understanding cultural differences in the antecedents of pro-environmental behavior: A comparative analysis of business students in the United States and Chile. *Journal of Environmental Education, 41*, 224-238. doi: 10.1080/00958960903439997

Corral-Verdugo, V., & Armendariz, L. I. (2000). The "new environmental paradigm" in a Mexican community. *Journal of Environmental Education, 31*, 25–31.

Corral-Verdugo, V., & Pinheiro, J. Q. (2006). Sustainability, future orientation and water conservation. *Revue Européenne de Psychologie Appliquée/European Review of Applied*

Psychology, 56, 191-198. doi: 10.1016/j.erap.2005.09.002

Costa P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI): Professional Manual*. Psychological Assessment Resources: Odessa, FL.

Davidson, D. J., & Freudenburg, W. R. (1996). Gender and environmental risk concerns: A review and analysis of available research. *Environment and Behavior, 28,* 302–339.

De Groot, J. I. M., & Steg, L. (2009). Morality and prosocial behavior: The role of awareness, responsibility, and norms in the norm activation model. *Journal of Social Psychology, 149*, 425-449.

De Groot, J. I. M., & Steg, L. (2010). Morality and nuclear energy: Perceptions of risks and benefits, personal norms, and willingness to take action related to nuclear energy. *Risk Analysis, 30,* 1363-1373.

Dietz, T., Kalof, L., & Stern, P. C. (2002). Gender, values, and environmentalism. *Social Science Quarterly, 83,* 353–364.

Dietz, T., Stern P. C., & Guagnano, A. (1998). Social structural and social psychological bases of environmental concern. *Environment and Behavior, 30,* 450–471.

di Nenna, P. M., Paolillo, V., & Giuliani, M. M. (1987). Le convinzioni ambientaliste dei cacciatori italiani: Indagine conoscitiva per mezzo dell' "I.C.A. test." (Environmental values of Italian hunters: A cognitive study based on the ICA test). *Movimento, 3,* 104–110.

Dodds, J., & Lin, C. (1992). Chinese teenagers' concerns about the future: A cross-national comparison. *Adolescence, 27,* 481–486.

Drori, I., & Yuchtman-Yaar, E. (2002). Environmental vulnerability in public perceptions and attitudes: The case of Israel's urban centers. *Social Science Quarterly, 83,* 53–63.

Dunlap, R. E., Gallup, G. H., & Gallup, A. M. (1993). 'Of global concern:' Results of the Health and Planet Survey. *Environment, 35,* 7–15, 33–40.

Eagles, P. F., & Demare, R. (1999). Factors influencing children's environmental attitudes. *Journal of Environmental Education, 30*(4), 33–37.

Eckberg, D. L., & Blocker, T. J. (1989). Varieties of religious involvement and environmental concerns: Testing the Lynn White thesis. *Journal for the Scientific Study of Religion, 28,* 509–517.

Eckberg, D. L., & Blocker, T. J. (1996). Christianity, environmentalism, and the theoretical problem of fundamentalism. *Journal for the Scientific Study of Religion, 35,* 343–355.

Eisler, A. D., Eisler, H., Yoshida, M. (2003). Perception of human ecology: Cross-cultural and gender comparisons. *Journal of Environmental Psychology, 23,* 89–101.

Eiser, J. R., Hannover, B., Mann, L., Morin, M. et al. (1990). Nuclear attitudes after Chernobyl: A cross-national study. *Journal of Environmental Psychology, 10,* 101–110.

Elliott, S. J., Taylor, S. M., Walter, S., Stieb, D., Frank, J., & Eyles, J. (1993). Modelling psychosocial effects of exposure to solid waste facilities. *Social Science and Medicine, 37,* 791–804.

Enqvist Jonsson, A-K., & Nilsson, A. (in press). Exploring the relationship between values and pro-environmental behavior: The influence of locus of control. *Environmental Values.*

Fielding, K. S., & Head, B. W. (2012). Determinants of young Australians' environmental actions: the role of responsibility attributions, locus of control, knowledge and attitudes. *Environmental Education Research, 18,* 171-186. doi: 10.1080/13504622.2011.592936

Fornara, F., Carrus, G., Passafaro, P., & Bonnes, M. (2011). Distinguishing the sources of formative influence on proenvironmental behaviors: The role of local norms in household waste recycling. *Group Processes and Intergroup Relations, 14,* 623-635.

Fraj, E., & Martinez, E. (2006). Influence of personality on ecological consumer behaviour. *Journal of Consumer Behaviour, 5*(3), 167-181. doi: 10.1002/cb.169

Franzen, A. (2003). Environmental attitudes in international comparison: An analysis of the ISSP surveys 1993 and 2000. *Social Science Quarterly, 84,* 297–308.

Furman, A. (1998). A note on environmental concern in a developing country: Results from an Istanbul survey. *Environment and Behavior, 30,* 520–534.

Gambro, J. S., & Switzky, H. N. (1999). Variables associated with American high school students' knowledge of environmental issues relates to energy and pollution. *Journal of Environmental Education, 30*(2), 15–22.

Gifford, R. (2006). A general model of social dilemmas. *International Journal of Ecological Economics and Statistics, 5,* 23-40.

Gifford, R. (2008). Toward a comprehensive model of social dilemmas. In A. Biel, D. Eek, T. Gärling, & M. Gustafsson (Eds). New issues and paradigms in research on social dilemmas. New York: Springer.

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist, 66,* 290-302.

Gifford, R., Hay, R., & Boros, K. (1982–83). Individual differences in environmental attitudes. *Journal of Environmental Education, 14(2),* 19–23.

Gifford, R., Scannell, L., Kormos, C., Smolova, L., Biel, A., Boncu, S., Corral, V., Hanyu, K., Hine, D. W., Kaiser, F. G., Korpela, K., Lima, L., Mertig, A. G., Garcia Mira, R., Moser, G., Passafaro, P., Pinheiro, J. Q., Saini, S., Sako, T., Sautkina, E., Savina, Y., Schmuck, P., Schultz, P. W., Sobeck, K., Sundblad, K., & Uzzell, D. (2009). Temporal pessimism and spatial optimism in environmental assessments: An 18-nation study. *Journal of Environmental Psychology, 29,* 1-12.

Gilg, A., Barr, S., & Ford, N. (2005). Green consumption or sustainable lifestyles? Identifying the sustainable consumer. *Futures, 37,* 481-504. doi: 10.1016/j.futures.2004.10.016

Göksen, F., Adaman, F., Zenginobuz, E. Ü. (2002). On environmental concern, willingness to pay, and postmaterialist values: Evidence from Istanbul. *Environment and Behavior, 34,* 616–633.

Greeley, A. (1993). Religion and attitudes toward the environment. *Journal for the Scientific Study of Religion, 32,* 19–28.

Greenwald, J. M. (1993). Environmental attitudes: A structural developmental model. *Dissertation Abstracts International, 53*(12-B), 6550.

Grendstad, G., & Wollebaek, D. (1998). Greener still? An empirical examination of Eckersley's ecocentric approach. *Environment and Behavior, 50,* 653–675.

Grieve, K. W., & Van Staden, F. J. (1985). Environmental concern in South Africa: An attitudinal study. *South African Journal of Psychology, 15,* 135–136.

Guth, J. L., Green, J. C., Kellstedt, L., & Smidt, C. (1995). Faith and the environment: Religious beliefs and attitudes on environmental policy. *American Journal of Political Science, 39,* 64-382.

Gutteling, J. M., & Wiegman, O. (1993). Gender-specific reactions to environmental hazards in the Netherlands. *Sex Roles, 28,* 433–447.

Hand, C. M., & Van Liere, K. D. (1984). Religion, mastery-over nature, and environmental concern. *Social Forces, 63,* 555–570.

Hausbeck, K. W., Milbrath, L. W., & Enright, S. M. (1992). Environmental knowledge, awareness and concern among11th-grade students: New York State. *Journal of Environmental Education, 24*(1), 27–34.

Hayes, B., & Marangudakis, M. (2001). Religion and environmental issues among Anglo-

American democracies. *Review of Religious Research, 42,* 159-174.

Heath, Y., & Gifford, R. (2002). Extending the theory of planned behavior: Predicting the use of public transportation. *Journal of Applied Social Psychology, 32,* 2154-2189.

Heath, Y., & Gifford, R. (2006). Free-market ideology and environmental degradation. *Environment and Behavior, 38,* 48–71.

Herrera, M. (1992). Environmentalism and political participation: Toward a new system of social beliefs and values? *Journal of Applied Social Psychology, 22,* 657–676.

Hinds, J., & Sparks, P. (2008). Engaging with the natural environment: The role of affective connection and identity. *Journal of Environmental Psychology*, *28,* 109-120. doi: 10.1016/j.jenvp.2007.11.001

Hines, J., Hungerford, H. R., & Tomera, A. N. (1986-87). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *Journal of Environmental Education, 18*(2), 1-8.

Hirsh, J. B. (2010). Personality and environmental concern. *Journal of Environmental Psychology, 30,* 245-248. doi: 10.1016/j.jenvp.2010.01.004

Holbert, R. L., Kwak, N., & Shah, D. V. (2003). Environmental concern, patterns of television viewing, and pro-environmental behaviors: Integrating models of media consumption and effects. *Journal of Broadcasting & Electronic Media, 47,* 177–196.

Honnold, J. A. (1984–85). Age and environmental concern: Some specification of effects. *Journal of Environmental Education, 16*(1), 4–9.

Howard, G. S., Delgado, E., Miller, D., & Gubbins, S. (1993). Transforming values into actions: Ecological preservation though energy conservation. *Counseling Psychologist, 21,* 582–596.

Howe, D. C., Kahn, Jr., P. H., & Friedman, B. (1996). Along the Rio Negro: Brazilian children's

environmental views and values. *Developmental Psychology, 32*, 979–987.

Howes, Y., & Gifford, R. (2009) Stable or dynamic value importance?: The interaction between value endorsement level and situational differences on decision-making in environmental issues. *Environment and Behavior, 41,* 549-582.

Hsu, S. J., & Rothe, R. E. (1996). An assessment of environmental knowledge and attitudes held by community leaders in the Hualien area of Taiwan. *Journal of Environmental Education, 28*(1), 24–31.

Huddart-Kennedy, E., Beckley, T. M., McFarlane, B. L., & Nadeau, S. (2009). Rural-urban differences in environmental concern in Canada. *Rural Sociology, 74*, 309-329. doi: 10.1526/003601109789037268

Hunter, L. M. (2000). A comparison of the environmental attitudes, concern, and behaviors of native-born and foreign born U.S. residents. *Population and Environment: A Journal of Interdisciplinary Studies, 21,* 565–580.

Inglehart, R. (1995). Public support for environmental protection: Objective problems and subjective values in 43 societies. *PS: Political Science and Politics, 28*, 57–72.

Inglehart, R. (1997). *Modernization and post-modernization: Cultural, economic and political change in 43 societies*. Princeton, NJ: Princeton University Press.

Izzi Dien, M. (2003). Islam and the environment: Theory and practice. In R. C. Foltz, F. M. Denny, & A. Baharuddin (Eds.), *Islam and Ecology* (pp. 107–120). Cambridge, MA: Harvard University Press.

Joireman, J. A., Van Lange, P. A. M., & Van Vugt, M. (2004). Who cares about the environmental impact of cars? *Environment and Behavior, 36*, 187-206. doi: 10.1177/0013916503251476

Kahn, P. H. Jr., & Lourenço, O. (2002). Water, air, fire, and earth: A developmental study in

Portugal of environmental moral reasoning. *Environment and Behavior, 34,* 405–430.

Kaiser, F. G., & Shimoda, T. A. (1999). Responsibility as a predictor of ecological behavior. *Journal of Environmental Psychology, 19,* 243–253.

Kanagy, C. L., & Nelsen, H. M. (1995). Religion and environmental concern: Challenging the dominant assumptions. *Review of Religious Research* , *37,* 33-45.

Kanagy, C. L., & Willits, F. K. (1993). A "Greening" of Religion? Some evidence from a Pennsylvania sample. *Social Science Quarterly, 74,* 675-683.

Kemmelmeier, M., Król, G., & Young, H. K. (2002). Values, economics, and proenvironmental attitudes in 22 societies. *Cross-Cultural Research: The Journal of Comparative Social Science, 36,* 256–285.

Kilbourne, W. E., Beckmann, S. C., & Thelen, E. (2002). The role of the dominant social paradigm in environmental attitudes: A multinational examination. *Journal of Business Research, 55,* 193–204.

Klineberg, S. L., McKeever, M., & Rothenbach, B. (1998). Demographic predictors of environmental concern: It does make a difference how it's measured. *Social Science Quarterly, 79,* 734–753.

Kormos, C., & Gifford, R. (submitted). The validity of self-report measures of proenvironmental behavior: A meta-analytic review. *Journal of Environmental Psychology.*

Kuhlemeier, H., van den Bergh, H., & Lagerweij, N. (1999). Environmental knowledge, attitudes, and behavior in Dutch secondary education. *Journal of Environmental Education, 30*(2), 4–14.

Laidley, T. M. (2011). The influence of social class and cultural variables on environmental behaviors: Municipal-level evidence from Massachusetts. *Environment and Behavior*. doi: 10.1177/0013916511416647

Levenson, H. (1973). Perception of environmental modifiability and involvement in antipollution activities. *Journal of Psychology: Interdisciplinary and Applied, 84,* 237-239.

Levenson, H. (1974). Activism and powerful others: Distinctions within the concept of internal-external control. *Journal of Personality Assessment, 38,* 377-383.

Levine, D. S., & Strube, M. J. (2012): Environmental attitudes, knowledge, intentions and behaviors among college students. *Journal of Social Psychology, 152,* 308-326.

Lima, M. L., & Castro, P. (2005). Cultural theory meets the community: Worldviews and local issues. *Journal of Environmental Psychology, 25,* 23–35.

Low, B. S. (1996). Behavioral ecology of conservation in traditional societies. *Human Nature, 7,* 353–379.

Lubell, M. (2002). Environmental activism as collective action. *Environment and Behavior, 34,* 31–454.

Luchs, M., & Mooradian, T. (2012). Sex, personality, and sustainable consumer behaviour: elucidating the gender effect. *Journal of Consumer Policy, 35,* 127-144. doi: 10.1007/s10603-011-9179-0

Lutz, A. R., Simpson-Housley, P., & de Man, A. F. (1999). Wilderness: Rural and urban attitudes and perceptions. *Environment and Behavior, 31,* 259-266.

Lyons, E., & Breakwell, G. M. (1994). Factors predicting environmental concern and indifference in 13- to 16-year-olds. *Environment and Behavior, 26,* 223–238.

Markowitz, E. M., Goldberg, L. R., Ashton, M. C., & Lee, K. (2012). Profiling the "pro-environmental individual:" A personality perspective. *Journal of Personality, 80,* 81-111. doi: 10.1111/j.1467-6494.2011.00721.x

Matthies, E., Selge, S., & Klöckner, C. A. (2012). The role of parental behaviour for the development of behaviour specific environmental norms—The example of recycling and

re-use behaviour. *Journal of Environmental Psychology, 32*, 277-284.

McAllister, I., & Studlar, D. T. (1999). Green versus brown: Explaining environmental commitment in Australia. *Social Science Quarterly, 80*, 775–792.

McKnight, M. D. (1991). Socialization into environmentalism: Development of attitudes toward the environment and technology. *Dissertation Abstracts International, 52*(1-A), 301.

Meinhold, J. L. & Malkus. A. J. (2005). Adolescent environmental behaviors: Can knowledge, attitudes, and self-efficacy make a difference? *Environment and Behavior, 37*, 511–532.

Milfont, T. L., & Gouveia, V. V. (2006). Time perspective and values: An exploratory study of their relations to environmental attitudes. *Journal of Environmental Psychology, 26*, 72–82.

Milfont, T. L., & Sibley, C. G. (2012). The big five personality traits and environmental engagement: Associations at the individual and societal level. *Journal of Environmental Psychology, 32*, 187-195. doi: 10.1016/j.jenvp.2011.12.006

Mohai, P., & Bryant, B. (1998). Is there a "race" effect on concern for environmental quality? *Public Opinion Quarterly, 62*, 475–505.

Mostafa, M. M. (2011). Does globalisation affect consumers' pro-environmental intentions? A multilevel analysis across 25 countries. *International Journal of Sustainable Development & World Ecology*, 1-9. doi: 10.1080/13504509.2011.614289

Naess, A. (1989). *Ecology, community, and lifestyle: An outline of an ecosophy*. Cambridge, UK: Cambridge University Press.

O'Connor, R. E., Bord, R. J., Yarnal, B., & Wiefek, N. (2002). Who wants to reduce greenhouse gas emissions? *Social Science Quarterly, 83*, 1-17.

Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behavior cross-nationally. *Environment and Behavior, 38*, 462-483. doi: 10.1177/0013916505286012

Ostman, R. E., & Parker, J. L. (1987). Impact of education, age, newspapers, and television on environmental knowledge, concerns and behaviors. *Journal of Environmental Education, 19*(1), 3–9.

Palmer, J. A. (1993). Development of concern for the environment and formative experiences of educators. *Journal of Environmental Education, 24*(3), 26–30.

Parker, J. D., & McDonough, M H (1999). Environmentalism of African Americans: An analysis of the subtropical city: Gaborone, Botswana. *Journal of Environmental Education, 30(2),* 31–39.

Paloniemi, R., & Vainio, A. (2011). Why do young people participate in environmental political action? *Environmental Values, 20,* 397-416. doi: 10.3197/096327111x13077055166108

Pinto, D. C., Nique, W. M., Añaña, E. d. S., & Herter, M. M. (2011). Green consumer values: How do personal values influence environmentally responsible water consumption? *International Journal of Consumer Studies, 35*(2), 122-131. doi: 10.1111/j.1470-6431.2010.00962.x

Poortinga, W., Steg, L., & Vlek, C. (2003). Myths of nature and environmental management strategies. A field study on energy reductions in traffic and transport. In G. Moser, E. Pol, Y. Bernard, M. Bonnes, & J. Corraliza, (Eds.), *People, places, and sustainability* (pp. 280–290). Ashland, OH: Hogrefe & Huber.

Ramayah, T., Lee, J. W. C., & Lim, S. (2012). Sustaining the environment through recycling: An empirical study. *Journal of Environmental Management, 102,* 141-147. doi: 10.1016/j.jenvman.2012.02.025 NOT IN TEXT

Rauwald, K. S., & Moore, C. F. (2002). Environmental attitudes as predictors of policy support across three countries. *Environment and Behavior, 34,* 709–739.

Raymond, C. M., Brown, G., & Robinson, G. M. (2011). The influence of place attachment, and

moral and normative concerns on the conservation of native vegetation: A test of two behavioural models. *Journal of Environmental Psychology, 31*, 323-335.

Reid, I., & Sa'di, I. (1997). Jordanian and British primary schoolchildren's attitudes towards the environment. *Educational Studies, 23*, 473-480.

Rice, G. (2006). Pro-environmental behavior in Egypt: Is there a role for Islamic environmental ethics? *Journal of Business Ethics, 65,* 373-390

Rice, G., Wongtada, N., & Leelakulthanit, O. (1996). An investigation of self-efficacy and environmentally concerned behavior of Thai consumers. *Journal of International Consumer Marketing, 9*(2), 1-19. doi: 10.1300/J046v09n02_01 NOT IN TEXT

Roberts, J.A. (1993). Sex differences in socially responsible consumers' behaviors. *Psychological Reports, 73,* 139-148. doi: 10.2466/pr0.1993.73.1.139

Robelia, B., & Murphy, T. (2012): What do people know about key environmental issues? A review of environmental knowledge surveys. *Environmental Education Research, 18,* 299-321.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs* 80: 1, Whole No. 609.

Scannell, L., & Gifford, R. (2010). The relations between natural and civic place attachment and pro-environmental behavior. *Journal of Environmental Psychology, 30,* 289-297.

Scannell, L. & Gifford, R. (2013). The role of place attachment in receptivity to local and global climate change messages. *Environment and Behavior, 45*, 60-85.

Schahn, J., & Holzer, E. (1990). Studies of individual environmental concern: The role of knowledge, gender, and background variables. *Environment and Behavior, 22*, 767–786.

Schuett, M. A., & Ostergren, D. (2003). Environmental concern and involvement of individuals in selected voluntary associations. *Journal of Environmental Education, 34*(4), 30-38.

Schultz, P. W., & Stone, W. F. (1994). Authoritarianism and attitudes toward the environment. *Environment and Behavior, 26*, 25–37.

Schultz, P. W., Unipan, J. B., & Gamba, R. J. (2000). Acculturation and ecological worldview among Latino Americans. *Journal of Environmental Education, 31*(2), 22–27.

Schultz, P. W., & Zelezny, L. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology, 19*, 255–265.

Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 221-279). New York: Academic.

Schwepker, C. H., & Cornwell, T. B. (1991). An examination of ecologically concerned consumers and their intention to purchase ecologically packaged products. *Journal of Public Policy and Marketing, 10*(2), 77-101.

Shanahan, J., Morgan, M., & Stenbjerre, M. (1997). Green or brown? Television and the cultivation of environmental concern. *Journal of Broadcasting and Electronic Media, 41*, 305–323.

Shaiko, R. G. (1987). Religion, politics, and environmental concern: A powerful mix of passions. *Social Science Quarterly, 68*, 244-262.

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*, 407-424. doi: 10.1111/0022-4537.00175

Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior, 25*, 322–348.

Swami, V., Chamorro-Premuzic, T., Snelgar, R., & Furnham, A. (2011). Personality, individual differences, and demographic antecedents of self-reported household waste management behaviours. *Journal of Environmental Psychology, 31*, 21-26. doi:

10.1016/j.jenvp.2010.08.001

Swim, J. K., Stern, P. C., Doherty, T., Clayton, S., Reser, J. P., Weber, E. U., Gifford, R., & Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change mitigation and adaptation. *American Psychologist, 66*, 241-250.

Swearingen, T. C. (1990). Moral development and environmental ethics. *Dissertation Abstracts International, 50*(12-B, Part 1), 5905.

Synodinos, N. E. (1990). Environmental attitudes and knowledge: A comparison of marketing and business students with other groups. *Journal of Business Research, 20*, 161-170.

Szagun, G., & Mesenholl, E. (1993). Environmental ethics: An empirical study of West German adolescents. Journal of *Environmental Education, 25*(1), 37–44.

Tabernero, C., & Hernández, B. (2011). Self-efficacy and intrinsic motivation guiding environmental behavior. *Environment and Behavior, 43*, 658-675. doi: 10.1177/0013916510379759

Tang, Z., Chen, X., & Luo, J. (2011). Determining socio-psychological drivers for rural household recycling behavior in developing countries. *Environment and Behavior, 43*, 848-877. doi: 10.1177/0013916510375681

Teisl, M. F., & O'Brien, K. (2003). Who cares and who acts? Outdoor recreationists exhibit different levels of environmental concern and behavior. *Environment and Behavior, 35*, 506–522.

Thøgersen, J., & Grønhøj, A. (2010). Electricity saving in households—A social cognitive approach. *Energy Policy, 38*, 7732-7743. doi: 10.1016/j.enpol.2010.08.025

Tikka, P. M., Kuitnen, M. T., & Tynys, S. M. (2000). Effects of educational background on students' attitudes, activity levels, and knowledge concerning the environment. *Journal of Environmental Education, 31(3),* 12–19.

Urien, B., & Kilbourne, W. (2011). Generativity and self-enhancement values in eco-friendly behavioral intentions and environmentally responsible consumption behavior. *Psychology and Marketing, 28,* 69-90. doi: 10.1002/mar.20381

Uyeki, E. S., & Holland, L. J. (2000). Diffusion of pro environmental attitudes. *American Behavioral Scientist, 43,* 646–662.

Van Liere, K. D., & Dunlap, R. E. (1980). The social bases of environmental concern: A review of hypotheses, explanations, and empirical evidence. *Public Opinion Quarterly, 44,* 181-197.

Walton, T., & Austin, D. M. (2011). Pro-environmental behavior in an urban structural context. *Sociological Spectrum, 31,* 260-287. doi: 10.1080/02732173.2011.557037

White, L. (1967). The historical roots of our ecological crisis. *Science, 155,* 1203-1207.

Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology, 29,* 13–23.

Whitney, E. (1993). Lynn White, ecotheology, and history. *Environmental Ethics, 15,* 151-169.

Wolkomir, M., Futreal, M., Wooddrum, E., & Hoban, T. (1997). Substantive religious belief and environmentalism. *Social Science Quarterly, 78,* 96–108.

Woodrum, E., & Hoban, T. (1994). Theology and religiosity effects on environmentalism. *Review of Religious Research,* 35, 193-206.

Wright, S. D., Caserta, M., & Lund, D. A (2003). Older adults' attitudes, concerns, and support for environmental issues in the 'new west.' *International Journal of Aging & Human Development, 57,* 151–179.

Xiao, C., & Hong, D. (2010). Gender differences in environmental behaviors in China. *Population & Environment, 32,* 88-104. doi: 10.1007/s11111-010-0115-z

Zelezny, L. C., Chua, P. P, & Aldrich, C. (2000). Elaborating on gender differences in environmentalism. *Journal of Social Issues, 56,* 443-457.

Zhang, J. (1993). Environmental hazards in the Chinese public's eyes. *Risk Analysis, 13,* 509–513.

Zheng, Y., & Yoshino, R. (2003). Diversity patterns of attitudes toward nature and environment in Japan, USA, and European nations. *Behaviormetrika, 30,* 21–37.