



Understanding the multi-dimensional structure of pro-environmental behavior



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ABSTRACT

We examined the multi-dimensional structure of pro-environmental behavior (PEB) in a mixed-methods study of rural residents of New York, USA. In Phase 1, we asked 41 landowners to identify a range of behaviors that might enhance local environmental quality. We then developed a 13-item PEB scale based on interview responses and literature review. In Phase 2, we incorporated this self-reported PEB scale into a survey of 1082 rural landowners and recreationists. Confirmatory factor analysis identified four key PEB domains: conservation lifestyle behaviors (e.g., household actions in the private sphere), social environmentalism (e.g., peer interactions and group membership), environmental citizenship (e.g., civic engagement in the policy arena), and land stewardship (e.g., support for wildlife and habitat conservation). Results revealed variable participation rates in each type of PEB, confirmed the need to account for land stewardship in rural settings, and highlighted challenges and opportunities for PEB assessment across various social and geographical contexts.

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1. Introduction

A growing body of research has highlighted the importance of studying human–environment interactions and identifying factors that influence adoption of behaviors that minimize ecological harm and support natural resource conservation (Ardoin, Heimlich, Braus, & Merrick, 2013; Cook & Berrenberg, 1981; Dwyer, Leeming, Cobern, Porter, & Jackson, 1993; Ehrlich & Kennedy, 2005; Gardner & Stern, 2002; Kaplan, 2000). Although the practical value of understanding pro-environmental behavior (PEB) is not disputed (Ardoin et al., 2013), the ways in which these behaviors are operationalized and critically evaluated have varied substantially.

Over the past few decades, researchers have used a variety of terms to describe this suite of actions, including “pro-environmental behaviors” (Bamberg & Moser, 2007; Steg, Bolderdijk, Keizer, & Perlaviciute, 2014), “responsible environmental behaviors” (Cottrell, 2003; Hines, Hungerford, & Tomera, 1986; Vaske &

Kobrin, 2001), “environmentally responsible behaviors” (De Young, 2000; Thøgersen, 2006), “ecological behaviors” (Gray, Borden, & Weigel, 1985; Kasier, 1998), “conservation behaviors” (Gosling & Williams, 2010; Kaiser, Hubner, & Bogner, 2005; Monroe, 2003), “environmentally supportive behaviors” (Huddart-Kennedy, Beckley, McFarlane, & Nadeau, 2009), and “environmentally significant behaviors” (Stern, 2000). However, many studies that employ such language fail to explicitly define the term (Poortinga, Steg, & Vlek, 2004). For instance, two highly-cited meta-analyses that synthesized data from hundreds of papers examined correlates of PEB without adequately considering the diversity and dimensionality of pro-environmental actions (Bamberg & Moser, 2007; Hines et al., 1986). Although substantial research has examined PEB predictors and correlates (Fielding, McDonald, & Louis, 2008; Kaiser et al., 2005; Milfont, Duckitt, & Wagner, 2010; Oreg & Katz-Gerro, 2006; Stern, 2000), comparatively little has examined the structure of the dependent variable itself. The wide range of ways in which PEB is operationalized in the literature raises two important questions that are inadequately addressed in previous studies: (1) what behaviors have been (or should be) considered “pro-environmental”; and, (2) to what extent have (or should) researchers discriminate between types of behaviors within this nexus? Because PEB is a key component of human–environment interactions, answers to these questions

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have important implications for the field of environmental psychology. In this study, we adopted a broad definition of PEB that parallels *Steg and Vlek (2009)*, considering a range of behaviors that benefit the natural environment, enhance environmental quality, or harm the environment as little as possible. We then integrated conceptualizations of PEB derived from existing survey scales and participant responses to open-ended interview questions to design and test an instrument encompassing four distinct domains of PEB, each of which could be considered separately in future investigations.

1.1. Theoretical evidence for multiple dimensions of PEB

Early attempts to characterize and measure complex constructs such as PEB (*Maloney & Ward, 1973; Sia, Hungerford, & Tomera, 1986*) and environmental concern (*Dunlap & Van Liere, 1978; Weigel & Weigel, 1978*) focused on uni-dimensional scales. Although such efforts (and the work they have inspired) have greatly advanced the understanding of human–environment interactions, these approaches have contributed to the potentially problematic presumption that PEB can be functionally characterized as “a unitary, undifferentiated class” (*Stern, 2000, p. 409*). In the complex world of human behavior, this is rarely the case (*Steg & Vlek, 2009*). Such insights inspired a number of studies that have critically examined multi-dimensional constructs such as environmental attitudes (*Milfont & Duckitt, 2004; 2010*) and environmental concern (*Schultz, 2001; Schultz et al., 2005*). However, despite increasing acknowledgment of the heterogeneous structure of pro-environmental behaviors (*Stern, 2000; Turaga, Howarth, & Borsuk, 2010*), few studies have empirically explored the multiple dimensions of PEB.

Dimensionality of PEB can exist for several reasons. First, some behaviors are inherently more difficult to carry out than others (*Kaiser, 1998*), and participation levels are influenced by a wide array of social and structural factors (*Gatersleben, Steg, & Vlek, 2002; Steg & Vlek, 2009; Theodori & Luloff, 2002*). For example, individuals committed to household energy conservation may relatively easily engage in such behavior, whereas individuals motivated to participate in environmental groups may be limited by access to organizations and financial constraints. Similarly, recycling may be a daily or weekly activity for many individuals in areas where curbside pickup is available and encouraged, but not in contexts where opportunities are few or altogether absent.

Second, participation in PEB is influenced by both hedonic, gain, and normative goals and intent (*Stern, 2000; Steg et al., 2014*). In many cases, motives centered on personal costs and benefits such as personal satisfaction (i.e., hedonic goals) and saving money (i.e., gain goals) may conflict with motives focused on achieving the collective good (i.e., normative goals) such as clean water and air (*Steg et al., 2014*). These drastically different motives not only result in different rates of behavioral expression; they may also affect the ways in which people perceive actions and their environmental impacts. A behavior that might constitute PEB to one individual could be viewed as an anti-environmental behavior by another. For instance, hunting to control wildlife populations might be viewed as ecologically essential by some and environmentally destructive (as well as morally repugnant) by others. In some cases, motivation and intent may be poor predictors of pro-environmental outcomes. For example, individuals may readily engage in actions they perceive to be environmentally-neutral without realizing the behaviors generate unintended positive or negative consequences.

Finally, PEB varies substantially when it comes to type of impacts (e.g., direct vs. indirect) (*Poortinga et al., 2004; Stern, 2000*) and scope of influence or specificity (e.g., local to global) (*Halpenny, 2010; Ramkissoon, Weiler, & Smith, 2013*). For instance, household

decisions made by private sector consumers such as carpooling to save gasoline and purchasing energy-efficient products to minimize consumption may produce long-term benefits that include small reductions in global greenhouse gas emissions. On the other hand, stream revitalization projects in a local community may immediately generate more significant ecological impacts, albeit on smaller scales.

Distinctions among different types of PEB are not only conceptually important, but psychologically meaningful (*Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, 2000*). Some researchers have therefore called for disaggregated PEB scales that account for variability in behavior based on factors such as feasibility of participation, behavioral intent, perception of importance, and the nature/magnitude of projected environmental impacts (*Gatersleben et al., 2002*). Heightened focus on distinct domains of PEB has inspired an assortment of hypothesized behavioral typologies (e.g., *Stern, 2000; Steg & Vlek, 2009; Turaga et al., 2010*), but research has rarely assessed the psychometric structure of these typologies. Exceptions include *Stern et al.'s (1999)* “indicators of environmentalism,” which has been employed in other studies (*Dono, Webb, & Richardson, 2010*), and *Kaiser, Oerke, and Bogner's (2007)* behavior-based environmental attitudes scale. However, both of these instruments emphasized certain aspects of PEB at the expense of others. For example, *Stern et al. (1999)* focused on consumer choices and environmental citizenship without adequate consideration of lifestyle behaviors (e.g., energy conservation, recycling), whereas *Kaiser, Oerke, and Bogner (2007)* focused on lifestyle behaviors and grouped other potentially significant PEBs into a single category titled “vicarious behaviors towards conservation.” These omissions and agglomerations make it difficult to effectively measure the full range of potential pro-environmental behaviors in a single study. Nevertheless, investigations such as these have helped to highlight important domains of PEB that should be considered in future research.

1.2. Potential PEB domains

Most studies in the environmental psychology literature have primarily emphasized PEB that occurs within the private sphere (*Kaiser, Ranney, Hartig, & Bowler, 1999; Kaiser et al., 2007; Mobley, Vagias, & DeWard, 2009; Nordlund & Garvill, 2002; Steg & Vlek, 2009*). Such conservation “lifestyle” behaviors are common targets because they are universal actions (i.e., relevant to nearly everyone) that are typically associated with environmentalism and the environmental movement. Frequently studied behaviors in this category include recycling (*Corral-Verdugo, 1997; Guagnano, Stern, & Dietz, 1995; Oreg & Katz-Gerro, 2006; Schultz, Oskamp, & Mainieri, 1995*), waste reduction (*Ebreo & Vining, 2001*), water conservation (*Corral-Verdugo, Carrus, Bonnes, Moser, & Sinha, 2008; Kaiser, 1998*), energy conservation (*Abrahamse, Steg, Vlek, & Rothengatter, 2005; Gatersleben et al., 2002; Kaiser et al., 2005; Nordlund & Garvill, 2002; Poortinga et al., 2004*) environmentally-conscious transportation (*Kaiser et al., 2005; Oreg & Katz-Gerro, 2006; Poortinga et al., 2004*) and green or eco-friendly purchasing (*Kahn, 2007; Nordlund & Garvill, 2002; Sia et al., 1986; Stern, 2000; Young, Hwang, McDonald, & Oates, 2010*). If such everyday actions are sufficiently widespread in the general population, they will generate an array of positive environmental impacts. However, a singular focus on the consumer-oriented household behaviors that are prevalent in many behavior measures may preclude the consideration of other types of PEB that may be of equal or greater ecological and social importance (*Stern, 2000; Steg & Vlek, 2009*).

Another suite of behaviors that has generated substantial interest among PEB researchers are those focused on civic

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