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Influence of recreational activity on water quality perceptions and concerns in Utah: A replicated analysis

Matthew J. Barnett[a,*], Douglas Jackson-Smith[a], Melissa Haeffner[b]

[a] The Ohio State University, USA
[b] Portland State University, USA

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ABSTRACT

Both social structural factors and direct sensory experiences can contribute to the development of environmental perceptions and concerns. We use two separate surveys of Utah adults to explore the association between sociodemographic characteristics and participation in recreational activities on water quality perceptions and concerns. We find that engaging in outdoor recreation is systematically associated with more positive water quality perceptions and higher levels of concern about impaired water quality. However, water quality perceptions appear to be shaped more by social characteristics (age, education, gender, race, religion, and income) and by generic measures of overall recreation behavior than by indicators of participation in particular forms of outdoor recreational activity. There is modest evidence that hikers, birdwatchers, and anglers are generally more likely to express concerns about impaired water quality, while boaters have more positive perceptions and lower levels of concern.

Management implications:

- The baseline results of this study can be used by water managers in Utah to track shifts in public attitudes toward water quality as the state grapples with rapid climatic and demographic changes in the coming years.
- Certain types of water recreation (e.g. hiking and birdwatching) are consistently predictive of greater concern about poor water quality. More frequent participation in these types of recreation may lead to increased receptivity to public policies aimed at addressing water quality problems.
- Some demographic groups in our sample are more likely to engage in outdoor recreation, which may have important implications for public engagement.

1. Introduction

Water quality impairment is a substantial environmental hazard which impacts a wide variety of stakeholders and interests, particularly those who participate in outdoor water-based recreational activities. Most water quality problems are also related directly or indirectly to decisions and behaviors made by human actors. To address water quality challenges effectively, it is important to understand how the public perceives and becomes concerned about water quality issues, and to use this information in the design of public programs and interventions (Artell, Ahtiainen, & Pouta, 2013; Tudor & Williams, 2003).

We know from previous research that social structural variables are systematically associated with heightened awareness of and concern about environmental problems by different social groups (Liu, Vedlitz, & Shi, 2014). Socioeconomic status, gender, race/ethnicity, and religion can shape sensitivity to environmental problems and culturally accepted views about the need to change personal behaviors that affect environmental outcomes (Abeles, 2013). It can also structure vulnerability and exposure to potential environmental risks (Chakraborty, Collins, & Grineski, 2016; Cutter, 1995). Beyond sociodemographic attributes, there remains an open debate about the degree to which direct personal experience with actual environmental conditions is essential to the development of heightened risk perceptions. Some have found that environmental experiences are important predictors of environmental concerns and changes in environmentally-relevant behaviors, although access to information and time to recreate at nearby rivers, creeks, and canals may be more available to certain social groups, such as high socio-economic status and white residents (Haeffner, Jackson-Smith, Buchert, & Risley, 2017; Larson, Whiting, & Green, 2011; Martha, Sanchez, & Gomà-i-Freixanet, 2009). At the same time, there is evidence that the public interaction with the environment can lead to inaccurate perceptions of actual threats to public health

* Corresponding author.
E-mail address: barnett.580@osu.edu (M.J. Barnett).

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(Frick, Degenhardt, & Buchecker, 2007; Pendleton, Martin, & Webster, 2001; Scherer & Cho, 2003).

Because the worst water quality impairment in the western United States tends to take place around areas of mixed land use (Brown & Froemke, 2012) the densely populated Wasatch Front Region in Utah provides an interesting setting for a study of water quality perceptions and concerns. As of 2014, 7007 miles of Utah's rivers and streams and 152,691 acres of lakes, reservoirs, and ponds have been classified as impaired (Environmental Protection Agency (EPA, 2014)). At the same time, Utah is a magnet for people interested in outdoor recreation, and residents of the Wasatch Front regularly participate in water-based recreational activities like hiking, skiing, snowmobiling, boating, hunting, and fishing (Office of Outdoor Recreation (OOR, 2013)). In this paper, we explore how sociodemographic characteristics and levels of participation in outdoor recreational activities shape perceptions and concerns about water quality in Utah. We use data from two large public surveys to test the hypothesis that increased outdoor recreational experiences are associated with more negative perceptions and heightened concerns about impaired water quality in this region.

2. Drivers of water quality perceptions and concerns

2.1. Water quality perceptions

The degree to which people are aware of water quality is linked to how they interact with and experience water (e.g., drinking water from a tap, engaging in outdoor recreation, etc.). Sensory experience can shape the development of human water quality perceptions (Strang, 2005). The patterns of sensory experience as a driver of water quality perception, however, have been found to differ between perceptions of drinking water versus outdoor water quality. Drinking water perceptions are driven mainly by direct experiences with taste, color, and odor, though sociodemographic characteristics (e.g., gender and race), attitudes and concerns about health, and neighborhood satisfaction are also important predictors (de França Doria, 2010; Dupont & Krupnik, 2010). People tend to evaluate or describe perceived outdoor water quality based on a number of less immediate sensory cues: water clarity, color, objects in the water (e.g., floating debris, water plants, algae, etc.) and odor (Moser, 1984; Smith, Croker, & McFarlane, 1995; West, Nolan, & Scott, 2016). Experiential factors such as past negative experiences with water (i.e., getting sick after coming into contact with dirty water via recreational participation) have also been shown to drive water quality perceptions (Canter, Nelson, & Everett, 1993).

Different types of recreation offer opportunities for interaction with natural water bodies with varying levels of sensory focus and experience. The idea of forms of "recreational specialization" was originally developed by Bryan (1977) to capture "a continuum of behavior from the general to the particular reflected by the equipment and skills used in the sport and activity setting preferences" (p. 175). This theoretical framework has been applied in numerous research settings to explore differences among diverse outdoor recreational activities such as boating, vehicle-based camping, rock climbing, and fishing (Donnelly, Vaske, & Graefe, 1986; McIntyre & Pigram, 1992; Merrill & Graefe, 1998; Mowen, Williams, & Graefe, 1997; Salz & Loomis, 2005). Early research regarding the possible link between recreation and perceptions of water quality noted that recreationalists were more aware of quality problems than non-recreationists, and that participants in different forms of recreation preferred distinct water quality characteristics (Dinius, 1981; Ditton & Goodale, 1973).

2.2. Water quality concerns

While awareness of environmental problems is a necessary precondition, it is important to translate perceptions into concerns to motivate human responses. A large social science literature on environmental concern has explored the role of social psychological factors (values, beliefs), social structural characteristics (gender, age, race/ethnicity, socioeconomic status), and direct experiences with the environment in explaining variation in levels of concern across time, space, and social groups. Stern and Dietz (1994) classic article about environmental values suggests that culturally constructed norms of egoism, altruism, and biocentrism predispose some persons to respond differently to information about environmental impairments.

Social structural variables (e.g., socioeconomic status, gender, race/ethnicity, and religion) are associated with heightened awareness of and concern about environmental problems by different social groups (Hunter & Toney, 2005; Liu et al., 2014; Phillips, Cragun, Kosmin, & Keysar, 2011; Van Lier & Dunlap, 1980; Xiao & McCright, 2012). Females tend to be more environmentally concerned than males (Xiao & McCright, 2007, 2012). Age has also been linked to environmental concern. The emergence of the US environmental movement in the 1960s and 70s led to a pattern in which younger people tended to be more environmentally concerned (Van Lier & Dunlap, 1980). As the baby boom generation aged, however, this association has flipped and more recent studies find consistent positive relationships between age and environmental concern (Liu et al., 2014). Meanwhile, more extensive levels of formal education have been associated with higher level of concern (Dietz, Stern, & Guagnano, 1998; Liu et al., 2014). Religious affiliation and religiosity have also been associated environmental concern, although the strength and directionality of these relationships has varied based on the denomination and the timeframe of study, and are also closely tied with ideology (Hunter & Toney, 2005). Religion is a particularly prominent feature of social structure in our study site (Utah), where 57% of the Utah population identified as belonging to the Church of Jesus Christ of Latter Day Saints (LDS, or Mormon) as of 2008 (Phillips et al., 2011). Several recent studies have shown that LDS residents have distinctive views on environmental issues and are generally less concerned about environmental problems and less supportive of pro-environmental policies and behaviors (Olsen-Hazboun, Krannich, & Robertson, 2017).

A smaller body of research has examined the effects of direct sensory experience on perceptions and concerns about water quality in particular. Flint et al. (2017) discovered a positive association between recreation and concerns about a wide range of water issues (including water quality impairment) among Utah residents. de França Doria (2010) found that sensory experience was significant in shaping both perception and concern, but that these experiences were mediated by past health experiences, different uses of media and other information sources, and levels of trust in water suppliers. Other experiential indicators, such as household proximity to waterways, have been found to influence household water quality perceptions and concerns (Brody, Highfield, & Alston, 2004). These links can be imperfect, however. Doria (2006) found that even when people perceive their drinking water to be high quality, they still express significant concerns about water impairments in their private drinking water sources, leading many to use bottled water or treatment devices.

2.3. The role of recreational activity

Recreation may be associated with environmental concerns because of the impacts of direct sensory experience, or because of the distinctive demographic characteristics of participants in particular forms of recreational activities. Dunlap and Heffernan (1975) were among the first to explore the relationship between participation in different types of recreation and environmental concern by examining the bivariate relationships between various environmental concern items and five separate categories of recreation—camping, hiking, visiting parks, fishing, and hunting. They found that 'appreciative,' or low-resource utilization activities (camping, hiking, and visiting parks) were associated with higher levels of environmental concern than 'consumptive,' or high-resource utilization activities (fishing and hunting). The appreciative/consumptive dichotomy has since been revisited by