



## Public parks usage near hydraulic fracturing operations



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### ARTICLE INFO

#### Keywords:

Fracking  
Parks and outdoor recreation  
Leisure participation  
Environmental management  
Public policy  
Appalachia

### ABSTRACT

Following the advent of hydraulic fracturing to effectively collect natural gas and oil, there has been growing interest in placing exploration and extraction wells in or adjacent to public park and forest systems across North America and Europe. At the heart of the debate about leasing public parkland is the concern that park acreage and accessibility will be lost to fracking operations, thereby decreasing park attendance. In this study, we apply value-belief-norm theory to evaluate park users' general attitudes toward fracking and public policy and their perceptions of fracking's impact on their recreational activity. A survey of 255 park users in the Appalachian Basin of the United States indicated that individuals holding strong pro-environmental attitudes in general would likely avoid parklands that are affected by fracking operations. Additionally, a majority of respondents reported concern that fracking would disrupt park access and thusly supported legislative bans of fracking in public parklands.

*Management implications:* This study provides initial insight into park users' attitudes toward hydraulic fracturing, especially how it relates to their recreational usage. Specially, the results indicate:

- Park users are concerned that fracking operations near local, state, or national parks would disrupt the accessibility and usage of those parks.
- Knowledge of fracking and the technological processes behind it is mixed among park users, suggesting that educational outreach efforts may contribute to greater support of or opposition to fracking projects.
- Local, state, or federal land managers considering leasing public land for oil or gas exploration must work with policymakers and energy operators to mitigate both the actual *and* perceived impacts on park usage and recreational pursuits.
- Additional research is necessary to evaluate the degree to which park usage has been impacted by park-proximate fracking operations.

Public parks and recreational facilities are important nodes within multi-scale community sport and recreation systems found across Europe, Australasia, and North America. In addition to offering protections to the environment and wildlife, they provide numerous opportunities to participate in sport and physical activity across skill levels and age. The programs and services offered in local, provincial-state, and national parks allow for citizens from diverse population groups to pursue sport, recreation, and leisure. The preservation and continued accessibility of these spaces—and the natural environments of which they are a part—is therefore paramount to fostering healthy

lifestyles and reversing the downward trends in youth and adult physical activity and sport participation (Romagosa, Eagles, & Lemieux, 2015). Moreover, many communities near or embedded within public parks and recreation tracts rely on high rates of park participation or consumption to sustain the cultural and economic livelihood (Crompton, 2006; Eagles & McCool, 2002; Goodwin, 2002; Mayer, Mueller, Woltering, Arnegger, & Job, 2010). Put simply, these spaces are significant to a number of stakeholders.

While less apparent than park visitors and community members, energy companies are becoming increasingly active stakeholders within

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these areas because of the valuable pockets of natural gas that underlie many public spaces. Following a series of innovations in and wide-scale implementation of hydraulic fracturing, or fracking, to effectively collect natural gas, there has been growing interest in placing exploration and extraction wells in or adjacent to a number of public park and forest systems across Europe and North America (e.g., Cowell, 2013; Rowland & Drabold, 2014). Opponents of fracking leases on public land have argued that in addition to air contaminants (Srebotnjak, 2014) and polluted wastewater in parks (Lustgarten, 2012), park acreage will be lost to fracking operations and park attendance will decrease (Gardner, 2014). For parks and recreation administrators, these outcomes would be especially troubling given the role that public green spaces are expected to play in reversing the decline in youth sport participation (The Aspen Institute, 2015), growing local economies through tourism and recreation-based consumption, and creating new generations of physically active recreation participants.

With these debates in mind, the purpose of this article is to explore the extent to which—if any—current and proposed fracking operations in or around designated public parks affect intentions of continued participation in recreation and physical activity in such areas. Specifically, in this study we evaluate park users' general attitudes toward fracking and public policy and their perceptions about how fracking operations impact their recreational activity. While there is a growing body of literature focused on environmental issues in leisure research, this preliminary study represents the first investigation specifically looking at park users' perceptions of fracking operations related to their decision to visit a park near a fracking operation.

## 1. Fracking and Parkland

Broadly defined, fracking refers to a stimulation technique that utilizes water, sand, and other chemicals to extract oil and natural gas from the earth. Scholarship and government research on fracking have increased in the past decade and offer some insight into the wide range of fracking's potential impacts. Important to the context of this study, Ridlington and Rumpler (2013) explain the process of fracking and how it impacts rural and parkland:

Fracking transforms rural and natural areas into industrial zones. This development threatens national parks and national forests, damages the integrity of landscapes and habitats, and contributes to water pollution problems that threaten aquatic ecosystems. Before drilling can begin, land must be cleared of vegetation and leveled to accommodate drilling equipment, gas collection and processing equipment, and vehicles. Additional land must be cleared for roads to the well site, as well as for any pipelines and compressor stations needed to deliver gas to market. A study by the Nature Conservancy of fracking infrastructure in Pennsylvania found that well pads average 3.1 acres and related infrastructure damages an additional 5.7 acres. (pp. 14–15)

Additionally, they note that fracking is threatening many national parks and forests including the White River National Forest, three national parks in the Delaware River Basin, Wayne National Forest, George Washington National Forest, and Otero Mesa. Although the threat of damage to national parks is concerning in and of itself, given the link between park access and community health, it is also vital to understand how people perceive and interact with—or are affected by—fracking.

Aided by the development of horizontal extenders to vertical wells, fracking increased rapidly in the early 2000s (Rabe & Borick, 2013). As of 2013, the fracking industry had grown to include thousands of wells in 17 U.S. states (Ridlington & Rumpler, 2013). Similar rates of growth have occurred in Canada and Australia (Ingelson & Hunter, 2014). In Europe, there are currently no commercial wells, though leaders in several countries have expressed interest in investing in fracking technology—initiatives that have resulted in numerous pro-

tests and demonstrations (e.g., Gayle, 2016; Inman, 2016). Additionally, in late 2015, Members of Parliament passed controversial legislation allowing “fracking 1200 m below national parks and sites of special scientific interest, as long as drilling takes place from outside protected areas” (Perraudin, 2015, para. 3). Since its U.S. growth in the early 2000s, fracking has emerged as an extremely divisive issue locally, domestically, and globally. Supporters of the extraction technique have argued that fracking is good for the economy, reduces pollution by lowering dependence on coal, and leads the country toward energy independence (Jackson et al., 2014). Opponents of fracking suggest that it contaminates water, takes support away from renewable energy sources, and releases toxins into the air (Jackson et al., 2014). The large concern from this latter group is the appearance of fracking where oil and gas production was not present previously, and the close proximity to their homes.

The perceived problems associated with fracking have been highlighted in a number of highly publicized incidents. For instance, fracking operations have led to polluted groundwater in Colorado (Finley, 2012) and contaminated drinking water in Pennsylvania (Pennsylvania Department of Environmental Protection, 2014). More broadly, fracking has been blamed for an increased prevalence of earthquakes (United States Geological Survey, 2015), higher levels of methane emission (Jackson et al., 2014), and burdening local water supplies (Nicot & Scanlon, 2012). Still, on the other hand, fracking has been shown to produce less air pollution than oil and coal (Nicot & Scanlon, 2012) and grow the U.S. economy (Engelder, 2011).

A key component of fracking to consider in this project is the perceptions of and interactions with fracking among community members in areas impacted by the activity. In many places, community members struggle to understand fracking in totality given the lack of public information (Rabe & Borick, 2013). In Boudet, Clarke, Bugden, Maibach, Roser-Renouf, and Leiserowitz (2014) survey of 1061 individuals about their knowledge of and beliefs toward fracking, the researchers found that age was a strong predictor of support, females generally opposed fracking, conservative political ideology positively predicted support, and formal education positively predicted support. Thomas et al. (2016) conducted a meta-analysis of 55 research articles related to public perceptions toward fracking in the US and Canada and found that although the term *fracking* typically invoked negative perceptions among individuals, the public was less certain about whether the benefits of fracking were outweighed by its risks. In this study, we similarly explore perceptions of fracking; as part of our investigation, we explore the degree to which individuals' existing environmental attitudes affect their perceptions of fracking and public park usage.

## 2. Research hypotheses

Value-belief-norm (VBN) theory has been utilized to explain support for social movements, focusing in particular on those associated with the environment (Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). As Stern et al. (1999) explained, “The base for general movement support lies in a conjunction of values, beliefs, and personal norms—feelings of personal obligation that are linked to one's self-expectations (Schwartz, 1977)—that impel individuals to act in ways that support movement goals” (p. 83). The prevailing rationale behind Stern et al.'s (1999) extension of Schwartz's theory is that actions are activated by moral norms. An example of this concept could be found in an individual's recognition that harm to the environment has consequences (i.e., awareness of consequences) and that actions the individual takes could help those consequences be avoided (i.e., ascription of responsibility to self).

In sum, VBN theory encompasses several conceptual approaches, including the universal theory of human values (Schwartz & Bilsky, 1987) and the theory of norms activation (Schwartz & Howard, 1981). As described by Casper, Pfahl, and McCullough (2014), VBN explains

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