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Beyond the tolerance/intolerance dichotomy: incorporating attitudes and acceptability into a robust definition of social tolerance of wildlife

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ABSTRACT

While most wildlife researchers and managers agree that human tolerance is critical in determining the success and persistence of wildlife populations, the concept of tolerance has lacked definitional precision and operational consistency in the literature. This inconsistency has opened the door to a multiplicity of human-wildlife tolerance studies that present tolerance as either an attitude, a normative belief, or a behavioral intention, making it difficult to compare results across study systems. We drew upon foundational human dimensions of wildlife, sociology, and animal behavior studies to propose an integrated framework of human-wildlife tolerance, defined here as “accepting wildlife and/or wildlife behaviors that one dislikes.” This definition clarifies the term “tolerance” by incorporating attitudes and acceptability (antecedents of behavior) as two distinct but interrelated axes. We also develop a typology framework that will provide insight into changing responses to human-wildlife conflict, and help evaluate future tolerance-boosting policy or educational interventions.

KEYWORDS

Tolerance; attitudes; acceptability; wildlife; theoretical framework

Introduction

Tolerance is considered a vital aspect of human-wildlife coexistence (Frank, 2016; Lotz, Kenyon, & Papouchis, 2017). When it comes to predicting the persistence of large carnivores, threatened and endangered species, and other wildlife, the boundaries of human tolerance are thought to be just as important as physical ecological limits like available habitat (Evelsizer, 2013). Despite the role of tolerance in guiding wildlife policy, the concept remains vaguely defined in the Human Dimensions of Wildlife (HDW) literature. Tolerance as currently employed encompasses a broad range of attitudes, beliefs, and behaviors toward wildlife, with the exact definition and measurement of the concept often varying from study to study (Harvey, Briggs-Gonzalez, & Mazotti, 2017; Treves & Bruskotter, 2014). Relatively few have examined the relationship between tolerance and other better-defined socio-psychological constructs, such as attitudes, normative beliefs, and behavioral intentions (Bruskotter, Singh, Fulton, & Slagle, 2015). Lack of clarity around the tolerance concept has led to the emergence of multiple directions of research in the HDW field, and while each is worthy in its own right, the results can be difficult to compare across populations, species of concern, study areas, cultures, and other

variables of interest. This inconsistency has led to a variety of definitions and conceptualizations that could present very different results even when applied to the same problems.

This article reviews tolerance definitions and metrics in HDW and related disciplines, merges common elements into a single definition, and expands this definition into a theoretical framework. We do not presume to know the correct and definitive tolerance metric; rather, our goal is to start a dialogue in an effort to stimulate discussion and contribute to the current state of knowledge.

Tolerance in HDW

Tolerance studies have relied upon an intuitive understanding of the concept that often differs depending on the situation (Bruskotter et al., 2015). Explicit definitions of tolerance have encompassed a broad range of concepts or differed on key aspects, making operationalization difficult. For example, tolerance in HDW has been described as (a) passive acceptance of a wildlife population (Bruskotter & Fulton, 2012; Inskip, Carter, Riley, Roberts, & MacMillan, 2016); (b) “individual-level judgments ... (such as attitudes and perceptions), as well as individual behaviors” (Treves & Bruskotter, 2014, p. 476); (c) “beliefs, emotions, attitudes, and inclinations to act” (Treves, Naughton-Treves, & Shelley, 2013, p. 317) and (d) “the ability and willingness of an individual to absorb the extra potential or actual costs of living with wildlife” (Kansky, Kidd, & Knight, 2016, p. 138). These varied definitions address different questions, but key inconsistencies have made it difficult to replicate tolerance metrics and to make policy recommendations. Below is a brief review and comparison of the various constructs that have been used to measure human tolerance of wildlife in the HDW literature, followed by a discussion of the major points of contention and agreement among researchers.

Tolerance as an Attitude

An attitude is a predisposition to respond in a favorable or unfavorable manner toward an object (Fishbein & Ajzen, 1975, 2010; Purdy & Decker, 1989). As an attitude, tolerance has been defined as a tendency to report positive, neutral, or negative judgments toward wildlife (Bruskotter et al., 2015; Kansky, Kidd, & Knight, 2014; Lewis et al., 2012; Wald & Jacobson, 2013). In a meta-study of human-mammalian conflict, Kansky, Kidd, & Knight (2014, p. 928) defined tolerance as “the proportion of individuals who have a *positive* attitude toward a species group despite suffering damage by that species group” (emphasis added). Other HDW studies constructed tolerance as an attitudinal scale ranging from “very intolerant” (a negative attitude) to “very tolerant” (a positive attitude) (Lewis et al., 2012). Finally, Bruskotter and Fulton (2012) characterized tolerance as a disposition (either attitudinally or behaviorally) toward inaction and passivity toward wildlife, a neutral point on a scale from active intolerance to active stewardship. Whether tolerance is considered a favorable attitude linked to stewardship behaviors or as an indifferent midpoint with no associated behaviors can fundamentally change the interpretation of the scale employed to measure the concept.

In social psychology, attitudes combine beliefs (cognition), feelings/emotions (affect), and a tendency or disposition to act in a certain way toward something (conation) (Fiske, Gilbert & Lindzey, 2010; Hewstone et al., 2005; Lutz, 1990). This definition suggests that as

an attitude, tolerance should incorporate beliefs, feelings, and behaviors rather than just a positive or negative response toward wildlife. A limited number of studies have incorporated emotions or affect into conceptualizations of tolerance as attitude (Frank, Glikman, Sutherland, & Bath, 2016; Jacobs, Vaske, & Roemer, 2012; Slagle, Bruskotter, & Wilson, 2012; Sponarski, Vaske, & Bath, 2015). These studies should be replicated and extended to integrate emotion into our current understanding of tolerance as an attitude.

Tolerance as a Normative Belief about Acceptability

Normative beliefs are defined as value-driven cognitions about the social acceptability of a specific action, situation, or behavior (Zinn, Manfredo, & Vaske, 2000; Zinn, Manfredo, Vaske, & Wittmann, 1998). This can include the acceptability of a species or acceptability of policies and management actions (Bruskotter & Wilson, 2014). Wildlife acceptance capacity (WAC) is a normative belief metric commonly employed in HDW research as a proxy for tolerance (Inskip et al., 2016; Struebig et al., 2018). WAC is also known as an individual or community's "cultural carrying capacity" for wildlife, and is typically measured by asking survey participants whether they believe a wildlife population should increase, decrease, or remain the same size (Riley & Decker, 2000; Skupien, Andrews, & Larson, 2016; Slagle, Zajac, Bruskotter, Wilson, & Prange, 2013). Bruskotter et al. (2015) demonstrated that both WAC and attitudes predict behavioral intentions toward wolves ($r \geq .70$), suggesting that either metric could be of practical use to wildlife managers.

Another metric examines human ability to tolerate unwanted wildlife behavior by measuring situation-specific beliefs about the acceptability of management actions in response to different wildlife conflict scenarios (Decker, Jacobson, & Brown, 2006; Zinn et al., 1998). Output from this measurement (i.e., a reaction norm) displays acceptability/tolerance thresholds for the human population under study. For example, Morzillo and Needham (2015) measured landowners' tolerance of beavers using human-beaver conflict scenarios of increasing severity ("beaver seen," "beaver chews trees," "beaver floods building") and asking respondents to rate the appropriateness of different management actions ("do nothing," "capture and relocate the beaver," "destroy the beaver") for each scenario. Results indicated that the acceptability of invasive management actions increased with severity of beaver impacts. While WAC is a broad metric that captures tolerance of wildlife populations in general, reaction norms can reveal tolerance toward specific wildlife behaviors as well as the acceptability of different management actions.

Tolerance as Behavioral Intent

Unlike attitudes and beliefs, human behavior directly influences the survival of wildlife populations, and some researchers have considered tolerance mainly in this context. In Bruskotter's (2012) conceptual model, tolerance and acceptance comprise the middle region in a behavioral spectrum that ranges from intolerance (engaging or planning to engage in anti-conservation behaviors) to stewardship (engaging or planning to engage in pro-conservation behaviors). Here, tolerance was defined by inaction, passivity, and/or restraint in interactions with wildlife (e.g., choosing not to kill problematic red foxes) (Cerri, Mori, Vivarelli, & Zaccaroni, 2017). Others have created latent tolerance metrics that combine attitude, belief, and/or behavioral intention statements (Rodgers & Pienaar,

2018). For example, hunters were asked about their intentions to poach wolves as part of a multi-item tolerance scale that included belief and attitude statements (Treves et al., 2013). Along with measurements of the normative and attitudinal antecedents of human actions, behavioral metrics may allow us to understand the implications of tolerance in populations of interest.

Tolerance in Related Disciplines

Outside of HDW, tolerance has been more consistently defined. Animal behaviorists generally agree that tolerance is “the intensity of disturbance that an individual accepts without responding in a defined way” (Nisbet, 2000), while in sociology, tolerance is simply “putting up with something you do not like” (Vogt, 1997). Although these two definitions are used to measure vastly different phenomena, their meaning is fundamentally aligned. Both suggest passive inaction (“without responding,” or “putting up with”) in the face of a typically negative stimulus (“disturbance” or “something you do not like”). Both can be readily operationalized by defining the measurable threshold of disturbance beyond which action must be taken by the individual. To estimate tolerance, animal behaviorists measure the distance at which an animal flees an approaching human (Samia, Nakagawa, Nomura, Rangel, & Blumstein, 2015), while sociologists survey participants about the level of acceptable politically extremist activity before expecting policy changes (Sullivan, Piereson, & Marcus, 1979). Crucially, tolerance is not the same as indifference; there must be an element of dislike for tolerance to emerge (Bejder, Samuels, Whitehead, Finn, & Allen, 2009; van Doorn, 2014).

Integrating the Constructs and Defining Tolerance

Whether researchers measure tolerance as an attitude, normative belief, or behavior partially depends on the research question, the situation, and the constraints of the study (see Table 1 for examples). To incorporate the various conceptualizations while remaining relevant to wildlife management objectives, a tolerance definition should integrate attitudes, normative beliefs, and links to behavior and management applications. Drawing from HDW research as well as from the sociology and animal behavior literature, we define tolerance as **accepting wildlife and/or wildlife behaviors that one dislikes**.

Table 1. Examples of tolerance constructs used in HDW Literature.

Cognitive Construct	Specific Metric	Examples
Normative Beliefs	Wildlife Acceptance Capacity	Riley & Decker, 2000 Wald & Jacobson, 2013 Inskip et al., 2016 Struebig et al., 2018
	Acceptability of Management Actions	Decker et al., 2006 Morzillo & Needham, 2015
Attitudes	(Dis)agreement with Attitudinal Statements	Lewis et al., 2012 Treves et al., 2013 Kansky et al., 2014 Harvey, Briggs-Gonzalez, & Mazotti, 2017
Behavioral Intentions	Stewardship Intentions	Morzillo & Needham, 2015
	Passive Inaction	Bruskotter & Fulton, 2012 Cerri et al., 2017

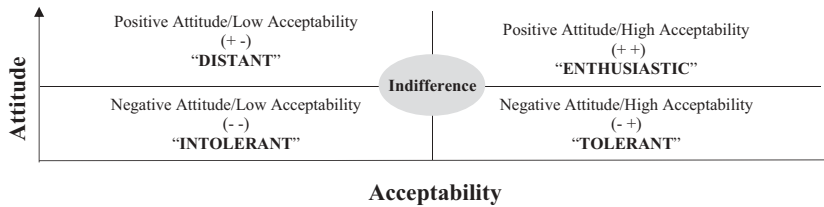


Figure 1. Proposed typology groups in the attitudes/acceptability framework.

This definition is broad and intuitive, yet incorporates two cognitive dimensions identified from the literature: acceptability of an object, action, or situation, and attitudes toward the same. “Tolerance” describes the position of those willing or compelled to accept unfavorable wildlife qualities due to overriding individual, sociocultural, or economic values, by a desire to comply with social norms, or by a perceived inability to affect change (van Velsor & Nilon, 2006).

While correlations between reported attitudes and normative beliefs have been demonstrated (Bruskotter et al., 2015), these constructs ultimately measure fundamentally different cognitions (Zinn et al., 1998). Salient attitudes guide wildlife educators and policymakers toward specific areas of concern and predict behavior when the behaviors themselves are difficult to identify (e.g., poaching). Normative beliefs about acceptability ask respondents to place themselves in a specific context with an animal, providing concrete thresholds that wildlife managers can use in decision-making. We identify four distinct typologies capturing the dimensions of this construct: the “enthusiastic” (with positive attitudes and high acceptability toward wildlife), the “distant” (positive attitudes but low acceptability), the “intolerant” (negative attitudes and low acceptability), and the “tolerant” (negative attitudes but high acceptability) (Figure 1). We also posit the existence of a group demonstrating neutral attitudes and acceptability – the “indifferent” – who have no strong feelings or beliefs about wildlife at all. These typologies should be considered both situation and individual-specific, and are likely influenced by culture, scale, and other factors differentiating human societies. An individual respondent may tolerate a species existing in the wilderness, but regress into intolerance when presented with a more intrusive situation, such as wildlife living near human communities (Casey, Krausman, Shaw, & Shaw, 2005; Manfredo, Zinn, Sikorowski, & Jones, 1998; Metcalf et al., 2015)

Application/Future Measurement

To measure tolerance of wildlife, future studies should include (a) normative beliefs about acceptability, (b) attitudes, and (c) behaviors/behavioral intentions. To identify thresholds for disturbance, studies could measure acceptability by presenting respondents with a series of human-wildlife interactions ranging from benign (e.g., wildlife seen in the wilderness) to more extreme (e.g., wildlife injures a human). These can be matched with a suite of management options ranging from less invasive (e.g., educate the public) to more invasive (e.g., euthanize wildlife) to understand patterns of tolerance (see Morzillo & Needham, 2015). Attitudes could be measured with a battery of statements intended to elicit positive or negative judgments, emotions, and cognitions about wildlife. Individuals can be assigned to one of the four proposed typologies depending on their scores on the

attitudinal/acceptability scales. Typology membership can be tracked between conflict scenarios, providing information about an individual's tolerance threshold. This framework can be tailored to provide useful, actionable recommendations across wildlife species and situations. Further research can demonstrate how psychological, cultural, sociological, temporal, and spatial variables affect an individual's tolerance of wildlife.

While managers agree that tolerance is key to the persistence of certain wildlife populations, sociological studies have found that true tolerance is still a relatively uncommon state of mind compared to active enthusiasm or consistent intolerance directed at a group (Peffley, Hutchison, & Shamir, 2015; Sullivan et al., 1979; van Doorn, 2014). However, given that some attitudes are relatively stable (Heberlein, 2012), tolerance-boosting strategies that target *acceptability* could potentially shift "intolerant," "indifferent," and "distant" people into the "tolerant" and "enthusiastic" domains, an outcome most wildlife managers would consider positive. Using the proposed framework in longitudinal studies to measure attitudes, acceptability, and behavioral intentions before and after implementing management strategies will be a crucial next step for research on tolerance (Karlsson & Sjöström, 2011; Naughton-Treves, Grossberg, & Treves, 2003).

All of these constructs have been measured in the HDW literature, though with limited consistency. The WAC scale is an exception that has been consistently applied across scenarios with utility for management agencies. The simplicity of this metric is a strength that allows for repeatability. However, because WAC is often measured as a single item, it can never fully access the entire spectrum of attitudes, beliefs, cognitions, and emotions that make up tolerance. Given the three components of attitude (e.g. cognition, affect, and conation), the HDW field should draw upon existing literature on emotion (Jacobs & Vaske, 2019; Slagle et al., 2012; Sponarski et al., 2015) and further develop attitudinal measures that incorporate all three components.

This framework with five predicted typology groups ("Enthusiastic," "Distant," "Tolerant," "Intolerant," "Indifferent") is intended as a conceptual aid for understanding the complex and scenario-specific relationships between attitudes and acceptability toward wildlife. The framework can also assist in the measurement of tolerance with wildlife. Boundaries for the proposed typologies should be considered context-dependent and could be aligned in any number of ways. This requires testing various metrics, refining existing scales, and determining if individuals actually coalesce into these groups. In particular, capturing the "indifferent" faction of respondents may be challenging, though crucial as this group tends to be most susceptible to improving attitudes and normative beliefs about acceptability through various treatments like education and outreach campaigns (see: Slagle et al., 2013).

Conclusion

This article seeks to facilitate the discussion of tolerance in HDW research. Our definition of tolerance, derived from HDW, sociological, and animal behavior theory, led to the construction of a typology that incorporates both attitudes and acceptability of wildlife. HDW researchers should continue to (a) consider the existence of realms beyond tolerance and intolerance in the public's conception of wildlife; (b) acknowledge the distinction between attitudes and normative beliefs, and measure both whenever possible; (c) move toward a consistent definition and metric of tolerance. Wildlife managers increasingly

look to HDW research about tolerance to guide conservation policy. Therefore, researchers have an immense responsibility to empirically test theoretically sound recommendations. Adoption of a consistent and justifiable tolerance definition and metric that can be translated across taxa will be vital moving forward.

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