

Research Article

Confidence, community & conservation: Exploring the relationship between self-efficacy and experience in female hunters

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ABSTRACT

Self-efficacy, or the belief we have in our own abilities, plays an important role in determining individuals' participation and success in outdoor activities. In the U.S., managers have increasingly sought ways to support underrepresented groups' participation in outdoor recreation. Hunting provides a particularly illustrative example, where female hunters and hunters of other racial and ethnic groups remain a starkly underrepresented, albeit growing constituent of the U.S. hunting population. In this study, we investigated the role of self-efficacy as it relates to female hunter participation to inform managers' innovative efforts to recruit and retain this important constituency. Specifically, we look at how self-efficacy and its components change as female hunters gain experience. In a sample of female Oregon hunters ($n = 147$) drawn from the 2008 big game license database conducted in the summer of 2010, we found that hunters with fewer years of experience had lower overall self-efficacy compared to more experienced hunters. While skills-based components of self-efficacy were lower for less experienced hunters, there was less of a difference in the social support-based components of self-efficacy as hunters gained experience. These findings suggest that social support is important for the recruitment and retention of all female hunters regardless of skill level or experience.

Management implications: Managers seeking to bolster or maintain hunter participation might consider tailoring recruitment and retention efforts to address the social support needs and unique motivations of female hunters as they seek to achieve the goals of inclusivity in hunting as well as conservation and wildlife management more broadly.

1. Introduction

Hunting is, and has been, an activity with stark gender disparities in the U.S. While other sports and recreational activities have seen dramatic progress towards gender parity in recent decades, female hunters still only make up 10% of the current hunting population (U.S. Fish and Wildlife Service and U.S. Census Bureau, 2016). However, while the overall hunting population has been declining since the early 1990s (Enck, Decker, & Brown, 2000; Gigliotti & Metcalf, 2016), the number of females who hunt has been growing (McFarlane, Watson, & Boxall,

2003; Metcalf, Graefe, Trautwein, & Burns, 2015).

Despite recent efforts among wildlife, natural resource, and recreation managers to promote an increase in representation of women¹ as well as ethnic and racial minorities in outdoor spaces, including hunting, much remains to be done (USFWS, 2016; Stodolska, Shinew, & Camarillo, 2020; Schultz et al., 2019; Hicks, Mirza, Rice, Richards, & Alarab, 2020; Flores, Falco, Roberts, & Valenzuela, 2018). In 2016, of the 11.5 million people aged 16 and over who hunted in the U.S., 10.3 million were male and 1.1 million were female, representing 8 percent and 1 percent of males and females, respectively, of the overall population.

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¹ In this paper, we refer to "women" hunters and "female" hunters interchangeably. The survey instrument in this research, however, used a male/female sex dichotomy, which we recognize as a limitation (see Discussion) and an opportunity for US Fish & Wildlife and other government agencies to improve heteronormative approaches to collecting data regarding sex and gender.

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According to the 2016 National Survey of Fishing, Hunting and Wildlife-Associated Recreation, of those who hunted, 97 percent (11.1 million) were white and the remaining 3 percent were Asian, African American, or classified as “Other.”

Understanding recreation equity as well as the social barriers for groups who are underrepresented in outdoor recreation has been of increasing concern and interest among scholars (Krymkowski, Manning, & Valliere, 2014; Metcalf, Burns, & Graefe, 2013; Shinew et al., 2006; Stodolska, 2015). Well-established in the outdoor recreation and leisure literatures is the influence of socialization, social relationships and social networks on outdoor recreation participation (Field & O’leary, 1973; Stokowski, 1990; Heywood, 1987; Flores & Kuhn, 2018). Social dynamics in outdoor recreation communities can contribute to subtle, yet influential perceptions of discrimination, which may be expressed as not feeling part of a community of recreationists (Byrne, 2012; Roberts & Rodriguez, 2008), or not feeling as though one belongs in a place or among a group (Kloek, Buijs, Boersema, & Schouten, 2017).

Persistent gender norms exist in both the participation and representation of women in outdoor recreation (Godtman King et al., 2020). Despite women’s participation in outdoor recreation increasing in Western societies, it is evident that women continue to be underrepresented and tend to be portrayed in conventional roles in popular media (Collins, 2011) rooted in normative discourses around beauty, motherhood, and care in leisure (Kinnaird & Hall, 1994; Wearing, 1998). By providing less visibility and fewer outdoor role models to women, media and marketing reflects, perpetuates, and further generates deeply held gender norms in our society (Godtman King, Margaryan, & Fuchs, 2020).

For women hunters, being starkly outnumbered by men and simultaneously underrepresented in media present social barriers to participation. As scholars of self-efficacy and social belonging have found (Hays, Thomas, Maynard, & Bawden, 2009, 2010, pp. 373–392; Loucks-Atkinson & Mannell, 2007; Vealey, Hayashi, Garner-Holman, & Giacobbi, 1998), and many people know through experience, it takes a lot of inner fortitude to persist in a space where people look at you with surprise as if to say, “What are you doing here?” As Mary Zeiss Stange writes in her essay, “Women and Hunting in the West”:

“Given the patriarchal social structures that shaped American society, those women who did venture afield, whether with the men in their lives or with other women, were more often than not judged by most of their peers to be displaying ‘eccentricity of conduct’ (Stange, 2005, n.p.).

Today, while women remain the “odd ones out” within the U.S. hunting population, recent increases in license purchases by women (USFW 2020) and discussions across popular media sources suggest that women hunters are an active and growing community (Levin, 2020; Mahoney, 2020). This demographic shift among U.S. hunters is an area ripe for academic inquiry and scholarship. Specifically, given that hunter education, skills training programs, and outreach materials have been designed and developed within a context of a predominately male audience, there is a need to build on existing scholarship related to hunter recruitment, retention, and reactivation (i.e., “R3”) (e.g., Enck et al., 2000; Larson, Stedman, Decker, Siemer, & Baumer, 2014; Ryan & Shaw, 2011; Vayer et al., 2021), with a focus on the needs of women hunters across their lifespan. This paper aims to begin that conversation.

We build off the work of Metcalf et al. (2015), who identified social support as a distinct component of self-efficacy contributing to females’ ability to negotiate through constraints to hunting participation. Social support can be defined as confidence derived through camaraderie, meaningful interpersonal connection, and the feeling of belonging when pursuing an activity or challenge (Prokopy, Floress, Klotthor-Weinkauff, & Baumgart-Getz, 2008; 1997; Vealey et al., 1998). Literature regarding hunting and social dynamics has shown that social support is an important predictor of whether or not individuals are more likely to be motivated to hunt or to continue to hunt in the future (Enck et al., 2000;

Hrubes, Ajzen, & Daigle, 2001; Stedman, 2012; Voorhees, 2007). These findings are consistent with broader scholarship on leisure participation and constraints (Godbey, Crawford, & Shen, 2010; Sharaievska, Stodolska, & Floyd, 2014; Stodolska et al. 2020; White, 2008). Social support contributes positively to hunter participation, both directly and indirectly by providing opportunities for hunters to learn skills from one another, access new hunting areas, and build camaraderie through sharing and eating wild game (Enck et al., 2000; Voorhees, 2007).

Along with social support, self-efficacy is comprised of an individual’s ability to develop and use skills to perform an activity (Bandura, 1997). Hunting is unique in that experiences, and subsequently skills, are gained slowly due to the limited opportunities each year for formative learning to happen. Unlike other activities where one can practice every day, hunters cannot harvest an animal each day and may endure long periods of time without even seeing harvestable animals. Moreover, hunting involves not only physical skill, but also psychological and ethical components that take years to acquire and hone.

We are interested in understanding how self-efficacy changes over the course of a female hunters’ lifetime as she gains experience. In the existing literature, hunting participation is often measured by whether individual hunters participate in a given year based on license sales data (Heberlein, Serup, & Ericsson, 2008; Larson et al., 2014; McFarlane et al., 2003; Winkler & Warnke, 2013). While this method is important to understand participation trends, license sales data do not provide information on the experience level of individual hunters. In this research, we were able to ask hunters how many years of experience they had to understand how self-efficacy, an antecedent factor to participation, differs as women advance as hunters. By better understanding the role of skills and social support in bolstering self-efficacy among female hunters, we aim to help managers improve recruitment and retention efforts and expand our understanding of self-efficacy theory in outdoor recreation more broadly.

1.1. Background: women who hunt – a growing community

Hunting is deeply rooted in cultures across the globe and has been foundational to our existence as humans; it has served as a means for people to harvest wild food for sustenance and played an integral role in shaping our relationship to land and the non-human natural world (i.e., wildlife) since time immemorial. While big-game hunting today is a male-biased behavior, this gendered pattern is not an ancestral one (Haas et al., 2020; Mahoney, 2020). From 12,000 year-old cave paintings that depict women in active roles in hunting and the existence of female hunting deities (perhaps the most famous being the Greek *Artemis*, also known as the Roman *Diana*) in early polytheistic religions across the globe to the persistence of ancestral hunting practices among Indigenous women today, women’s engagement in hunting represents diverse and meaningful traditions (Mahoney, 2020). As our relationship with nature and hunting has changed with the rise of Western “civilization,” patriarchal societies, and the industrialization of food, gender roles have changed, too.

In the U.S., the role of hunting has shifted from a necessary means of survival to an activity of choice, and often a form of outdoor recreation or sport. Understanding hunting participation has become more complex; motivations are diverse and interconnected. In recent history, the legacy of women in hunting in the U.S. found renewed expression in the 1990s, when the number of female hunters in the country roughly doubled to two million, and women went from representing three percent of the total hunting population to over ten percent (Fitzgerald, 2005). Some argue this surge was due in part to the release of rifle models in the 80s designed specifically for the female customer – one with an increasing amount of disposable income (Stange, Mary Zeiss; Oyster, 2000).

The upward trend in female participation in hunting has prompted attention from managers in light of the well-documented benefits of hunting for wildlife conservation and natural resource management in

the U.S. Specifically, hunting has implications for conservation agencies that receive a large portion of their budget from license sales revenue (McFarlane et al., 2003; Poudyal, Cho, & Bowker, 2008; Winkler & Warnke, 2013). Today, license fees and excise taxes on guns, ammunition and fishing equipment provide about 60% of the funding for state wildlife agencies, which manage most of the wildlife in the U.S. Given the recent decline in hunters in the U.S. of nearly 2 million in just the five year period between the 2011 and 2016 (according to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation) (U.S. Fish and Wildlife Service and U.S. Census Bureau, 2016), it is no surprise that there has been increased interest in recruiting and retaining female hunters, a growing constituent of the population. For example, there have been efforts dedicated to providing women with spaces to learn and share hunting skills and experiences (e.g., Artemis Sportswomen, Becoming an Outdoors Woman, Women on the Wing, Backcountry Hunters & Anglers women's-specific programming, First Hunt Foundation women's-specific programming).

Recent research exploring the specific needs and experiences of women hunters has found that participation in hunting is motivated by different factors and mediated by different variables compared to their male counterparts (Gigliotti & Metcalf, 2016; Metcalf et al., 2015). Gigliotti and Metcalf (2016) found that the food provisioning aspect of hunting motivates women more than men. Metcalf et al. (2015) also found that the 'family-oriented' hunter, who views hunting as a family activity rather than an individual one, reported the highest constraint levels to hunting (for reasons such as the added responsibilities involved with organizing gear, food, transportation, for more people) as well as the highest propensity to utilize negotiation strategies to hunt (e.g., sharing equipment and skill building among family members).

Not only do hunter identity divisions exist in terms of gender, but there are axes of differentiation among hunters rooted in values and motivations across demographic divisions (Essen, Heijgen, & Gieser, 2019). In recent decades, researchers have asked questions around what constitutes hunter identities in relation to one another, resolving to answer this question in terms of specialization, group identification and attribution theories (Essen et al. 2019; Kerr & Abel, 2016; Needham & Vaske, 2013). While women hunt for a diverse number of reasons (as do men), research shows that there is also 'unity in diversity' underlying females' motivations to hunt today. For example, a study by Gigliotti and Metcalf (2016) measured hunter motivations and gender differences with eight years of survey data of South Dakota Black Hills deer hunters (2001–2007, and 2010). Overall, females and males had similar rankings across eight motivations (social, nature, excitement, meat, challenge, trophy, extra hunting opportunity, and solitude). However, the most notable difference between female and male hunters was the significantly higher selection of "meat" by females as their most important motivation for hunting compared to males (22% vs. 7% respectively). Additionally, females rated the social reasons for liking hunting as significantly more important (Gigliotti & Metcalf, 2016).

In this paper, we focus on women hunters and the underlying social and psychological factors contributing to their participation in hunting. By investigating the important yet overlooked role of self-efficacy that mediates female participation in hunting, we aim to illuminate new areas of focus for female hunter recruitment and retention efforts that may benefit conservation and wildlife management.

1.2. Individual self-efficacy: concept & theory

While there is limited scholarship on self-efficacy in the context of hunting behavior (Covelli, 2011; Hrubes et al., 2001; Stedman, 2012), years of sport psychology research provide evidence that confidence is a key psychological factor differentiating successful and unsuccessful performance in a variety of sporting settings (Hays et al., 2009; Vealey, R. S., Hayashi, S.W., Garner-Holman, M., Giacobbi, 1998).

Measuring self-efficacy is a social-cognitive approach to understanding and explaining behaviors, specifically behaviors associated

with beliefs held by the individual (Bandura, 1977). Perceived self-efficacy can influence the effort used to overcome challenges or barriers (Bandura, 1977). According to Bandura (1986), "efficacy is theorized to influence motivation, effect, and consequently behavior" (in Loucks-Atkinson & Mannell, 2007, p. 20). Bandura proposed four main sources of self-efficacy—performance accomplishments, vicarious experiences, verbal persuasion, and physiological states—that have been supported by both descriptive and experimental research (Cramp & Bray, 2011; Hays et al. 2009; Propst & Koesler, 1998; Schumann and Sibthorp, 2013; Taniguchi, Widmer, & Ricks, 2017).

Other notable early research on this topic includes Vealey's (1986, 1998, 2001) work that expanded and reconceptualized Bandura's framework, providing evidence to support the reliability and validity of nine sources of self-confidence used by athletes when competing in sport that fall into three categories; 1) *Achievement*, which includes both mastery and demonstration of ability; 2) *Self-Regulation*, which includes physical and mental preparation and physical self-presentation and; 3) *Climate*, which includes factors such as sources of social support, mentorship, vicarious experience, and environmental comfort (Vealey, R. S., Hayashi, S.W., Garner-Holman, M., Giacobbi, 1998; Vealey, 1986).

Much of the contemporary literature in sport psychology on the sources of self-confidence uses the theories and framework of Bandura (1986) and Vealey (1986). For example, more recent work by Hays et al. (2007, 2010, pp. 373–392) extends the work of Bandura and Vealey, demonstrating the multidimensional nature of confidence and the importance of utilizing a sport-specific framework to aid future research (Hays et al., 2009; Hays, Thomas, Maynard, & Butt, 2010, pp. 373–392).

Here, we take a new approach, combining theories of self-efficacy from sport psychology to offer a different perspective for wildlife and hunting managers. Following Hays (2007, 2010, pp. 373–392), we acknowledge there are many different sources of confidence, which can be more or less important to overall self-efficacy in any given situation. However, for the purposes of this research we extend Bandura's (1986, 1997) and Vealey's (1986, 1998) frameworks and look specifically at two components of self-efficacy 1) skills-based efficacy: one's confidence in their skills related to the activity in question and 2) support-based efficacy: confidence that is derived through social support, camaraderie, and the feeling of belonging when pursuing an activity or challenge.

Bandura asserted that self-efficacy is determined not only by the skills an individual may possess, but also their ability to use those skills in the moments when they are needed (Bandura, 1997). An example of skills-based efficacy is where a hunter may be confident about their technical ability to handle a rifle and shoot accurately while target practicing, but lack confidence in their ability to maintain accuracy in field conditions or when the crosshairs fall on a live animal rather than a paper target. The differing degrees of confidence across a range of skills and under a variety of conditions all impact overall self-efficacy beliefs. Support-based efficacy is when social support is integrated in to an individual's hunting "climate" through meaningful interpersonal connections (Vealey et al., 1998). For example, when hunters feel they have a social network of people they can share hunting stories, traditions, and ideas with. In this paper, we conceptualize social support as a distinct component of self-efficacy (Fig. 1).

According to Bandura, self-efficacy can affect one's ability to overcome constraints, specifically intrapersonal constraints which may undermine recreation participation. Thus, in our conceptual model, we integrate the work of Loucks-Atkinson and Mannell (2007) and conceptualize self-efficacy as influencing—either increasing or decreasing—constraints a hunter experiences and their ability to overcome them through using negotiation strategies. Constraints are factors perceived or experienced by individuals that limit participation in recreation activities (Jackson, 1997) and have been researched particularly with regard to minority groups (Stodolska et al., 2020). For women hunters, existing research has shown that constraints are wide-ranging and can include structural factors such as childcare needs or a lack of

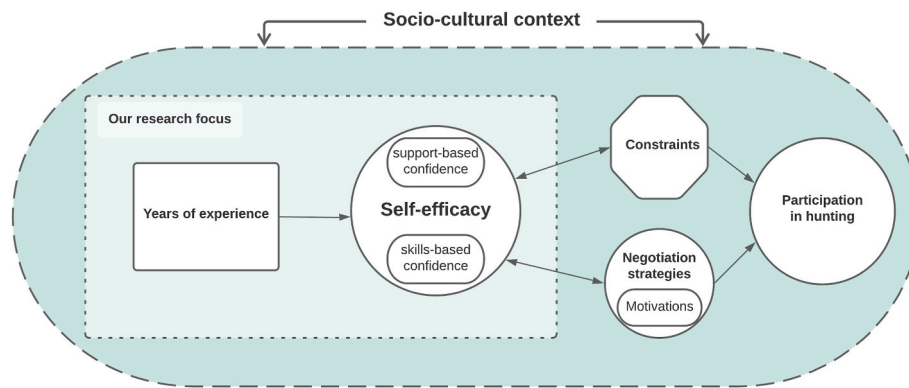


Fig. 1. Self-efficacy concept diagram.

training facilities to constraints such as a lack of hunting partners or a lack of skill (Metcalf et al., 2015). Constraints can be overcome using negotiation strategies, or ways individuals change their behavior to continue or increase their participation in activities (Jackson & Rucks, 1995). Negotiation strategies for women hunters include actions such as taking initiative to find partners to hunt with, fitting hunting in around other commitments, and budgeting money to be able to hunt more (Metcalf et al., 2015).

Women who hunt have negotiated a number of constraints, and their ability to do so is related to self-efficacy, which we hypothesize as multidimensional and changing uniquely over time (Fig. 1) (Loucks-Atkinson & Mannell, 2007). For example, a hunter with higher self-efficacy may not be constrained by a lack of hunting partners or may be better equipped to negotiate that constraint. We predict that promoting participation in hunting requires more than equipping women with hunting skills (i.e., skills-based confidence), but also requires fostering social-cultural influences such as feelings of belonging, and of encouragement and confidence gained from friends, family, and hunting partners (i.e., support-based confidence). By focusing in on self-efficacy in this research, we hope to illuminate an invisible and intangible factor related to hunting participation that has been largely overlooked in the literature on hunting and other outdoor recreation activities.

1.3. Study purpose

The purpose of this research was to understand how self-efficacy and its sub-components—skills-based confidence and support-based confidence—change with years of experience for female hunters. Specifically, we aimed to better understand how self-efficacy may or may not change as a result of experience and what this means for programming and outreach directed at recruiting and retaining female hunters in the U.S. We pursued these questions to, 1) understand how self-efficacy is derived; 2) document the role of self-efficacy as an antecedent factor for hunting participation; 3) elevate the research focus on this as an important dimension of hunting recruitment and retention.

2. Methods

We reanalyzed data collected in 2010 from a mail survey of Oregon big game hunters to more closely investigate relationships between self-efficacy and hunting experience among women. The primary purpose of the 2011 study was to investigate the factors associated with female hunting participation, including constraints, negotiation strategies, motivations, social support, and self-efficacy (Covelli, 2011). We recognize the limitations associated with reanalyzing data collected over a decade prior to this publication (see Discussion section) and describe how the theoretical contributions and management implications from this study remain relevant today.

A random sample of 1,500 Oregon hunters was drawn from the 2008

database of hunting license sales provided by the Oregon Department of Fish and Wildlife. To ensure an adequate number of females and males, the sample was split equally by gender, resulting in a random sample of 750 female big game hunters—hunting of large game animals, such as elk (*Cervus canadensis*), moose (*Alces alces*), deer (*Odocoileus virginianus*), pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), mountain goat (*Oreamnos americanus*), black bear (*Ursus americanus*) and many more. There was some concern about whether enough women would respond to the survey, so the authors drew a larger sample of females who held deer licenses. This decision was based on Organ and Fritzell (2000), who found that new and inexperienced hunters progress from small game into deer hunting and also assumes that females may be less experienced than their male counterparts. Thus, the sample was designed such that 70% of the females had purchased a deer license per Organ and Fritzell (2000), 15% had purchased elk licenses, and 15% had purchased bear licenses. The sample of males was representative of the type of game hunted in Oregon (50% deer, 25% elk, and 25% bear licenses).

The survey questionnaire was designed and pretested in the spring of 2010. It included demographic questions, hunting season characteristics, and items and constructs that relate to the constraint negotiation process. Data collection followed a Dillman Tailored Design Method (2007) with a pre-letter notification, full survey mailing, a reminder postcard, and a final full survey mailing. The mailings were conducted over a 2-month period in the summer of 2010.

The questionnaire also included ten self-efficacy items that addressed individuals' confidence in the social support and skills they have related to hunting (Table 1). The self-efficacy items were developed from the hunting literature as likely constraints to participation (Bandura, 2006; 1977; Loucks-Atkinson & Mannell, 2007). Respondents were asked to rate their confidence in these items using a scale of 0–100 (Bandura, 2006). Self-efficacy items were generally phrased in “can do” terms rather than “will do” terms and often refer to one's ability to execute behaviors (Covelli, 2011; Bandura, 2006). Also included in the survey was a fill-in-the blank question asking how many years an individual has been hunting.

We first conducted an exploratory factor analysis on the self-efficacy variables to identify the skills-based and support-based dimensionality of the ten self-efficacy items (Table 1). We used exploratory factor analysis with varimax rotation and then conducted reliability analyses to determine if the scaled items were reliably measuring the same construct (Cronbach alpha >0.7).

To test the relationship between years of experience and self-efficacy we developed generalized linear models with composite self-efficacy variables as the response variables (support-based confidence and skills-based confidence), years of experience the explanatory variable, and location (i.e. city, suburb, town or rural living) and level of education as possible control variables. Because the income question had high item non-response and age was highly correlated with years of

Table 1

Summary statistics and exact question wording for composite self-efficacy variables considered in models. Cronbach's alpha (α), scale, mean, and standard deviation (SD) are shown. $n = 147$.

Variable (α for composite variables)	Scale (range)	Mean (SD) for composite variables	Mean (SD) for individual variables	Question
Skills-based confidence (0.85)	0-100 (22–100)	82.5 (18.7)	74.8 (29.0)	I feel the skills I have are developed enough to hunt alone
			78.5 (28.4)	I am able to overcome my fears of hunting alone
			83.4 (21.3)	I can learn the skills necessary to hunt independently
			86.7 (18.7)	I have confidence in my hunting skills
			88.9 (17.2)	I am capable of setting aside my fears so I can hunt
Support-based confidence (0.83)	0-100 (38–100)	87.3 (14.7)	80.1 (25.2)	I am capable of finding ways to meet other people who hunt
			86.1 (19.1)	I am confident in my ability to develop friendships with other hunters
			86.6 (21.8)	I am able to keep hunting friends
			91.3 (14.8)	I am able to hunt regardless of others opinions about me
			91.8 (14.7)	If I want to learn more hunting skills I know who to ask

experience ($r = 0.75$), we excluded both variables from our models. We treated both confidence variables and years of experience as continuous and education and location as ordinal variables. We examined Akaike's Information Criterion (AIC) for each possible model in our candidate set and selected the model with the lowest AIC (Table 2). AIC, founded on information theory, estimates the relative amount of information lost by a given model intended to represent the process that generated the data. In estimating the amount of information lost by a model, AIC works to balance the trade-offs between the goodness of fit and the simplicity of the model (Burnham & Anderson, 2002).

For both final models, we examined residuals versus predicted values and normal quantile plots, finding some evidence of heteroskedastic variance for the support-based confidence model and some evidence of non-normality for the skills-based model, but nothing so severe as to

undermine confidence in our results. We also examined Cook's distance and found no influential observations.

3. Results

3.1. Respondent characteristics

Of the original 1,500 names and addresses drawn for the sample, 1,350 were deliverable. We received a total of 392 completed surveys, resulting in a response rate of 29%. Of the respondents, 56% self-reported as male and 44% as female. Analysis here focused solely on female respondents and examined only one component of many included in the survey questionnaire. After removing all partially completed responses from the analysis, our sample size was 147 females. Female respondents were between the ages 14–84 years, with a mean age of 47.9 years ($SD=16.2$). Female respondents had varying levels of education with 34.7% having a high school level or lower, 37.4% with some college, 23.1% completing college, and 4.8% having a graduate degree. Location of respondents also varied with 11.6% describing that they lived in cities, 7.5% in suburban areas, 22.4% in town, 58.5% in rural areas.

Respondents were generally experienced and had high self-efficacy scores (Table 1, Fig. 2). Female respondents had between 0 and 68 years of experience hunting, with a mean of 22.4 years ($SD=17.5$). We created two composite self-efficacy variables that reflect respondents' skills-based and support-based confidence (Table 1). Skills-based confidence ranged from 22 to 100, with a mean of 82.5 ($SD=18.7$), while support-based confidence ranged from 38 to 100, with a mean of 87.3 ($SD=14.7$) (see Fig. 3).

Females indicated that they were, on average, the most confident in their ability to know who to ask if they wanted to learn more hunting skills, with a mean of 91.8. Female respondents indicated they were the least confident in having developed the skills to be able to hunt alone ($M = 74.8$) and overcoming their fears of hunting alone ($M = 78.5$). The third lowest self-efficacy score for the female respondents was feeling capable of finding ways to meet other people who hunt, with a mean of 80.1 (Table 1).

3.2. Relationship between years of experience and skills-based and support-based confidence scores

Models with just the years of experience variable had the best fit (based on AIC) for predicting both skills-based confidence and support-based confidence (Tables 2–3). Adjusted R^2 values are moderate for the skills-based model and low for the support-based model, such that years of experience accounts for 15% and 5.8% of the model variance respectively; however, these values are not uncharacteristic of other social science studies. These results demonstrate that female hunters with more experience have higher skills-based and support-based confidence and thus self-efficacy. Our findings show that the relationship between experience and skills-based confidence ($\beta = 0.43$) is over two times stronger than that between experience and support-based

Table 2

The Akaike's Information Criterion (AIC) for each model in our candidate set, the difference in AIC between the model with just years of experience as the explanatory variable and other models (ΔAIC), K (the number of parameters in the model, plus 1), Log-Likelihood, and AIC weights.

Model	Skills-based					Support-based				
	K	AIC	ΔAIC	Log-Likelihood	Weight	K	AIC	ΔAIC	Log-Likelihood	Weight
years	3	1258.38	0	−626.19	0.66	3	1203.52	0	−598.76	0.72
years + location	6	1260.59	2.21	−624.3	0.22	6	1205.96	2.44	−596.98	0.21
years + edu	7	1262.09	3.71	−624.05	0.1	7	1209.07	5.55	−597.53	0.05
years + location + edu	10	1265.63	7.25	−622.82	0.02	10	1212.03	8.51	−596.01	0.01
null	2	1281.88	23.5	−638.93	0	2	1211.3	7.78	−603.65	0.015
location	5	1283.87	25.49	−636.94	0	5	1215.12	11.6	−602.56	0.002
edu	6	1284.45	26.07	−636.23	0	6	1216.15	12.63	−602.07	0.001
location + edu	9	1288.07	29.69	−635.03	0	9	1220.46	16.94	−601.23	0

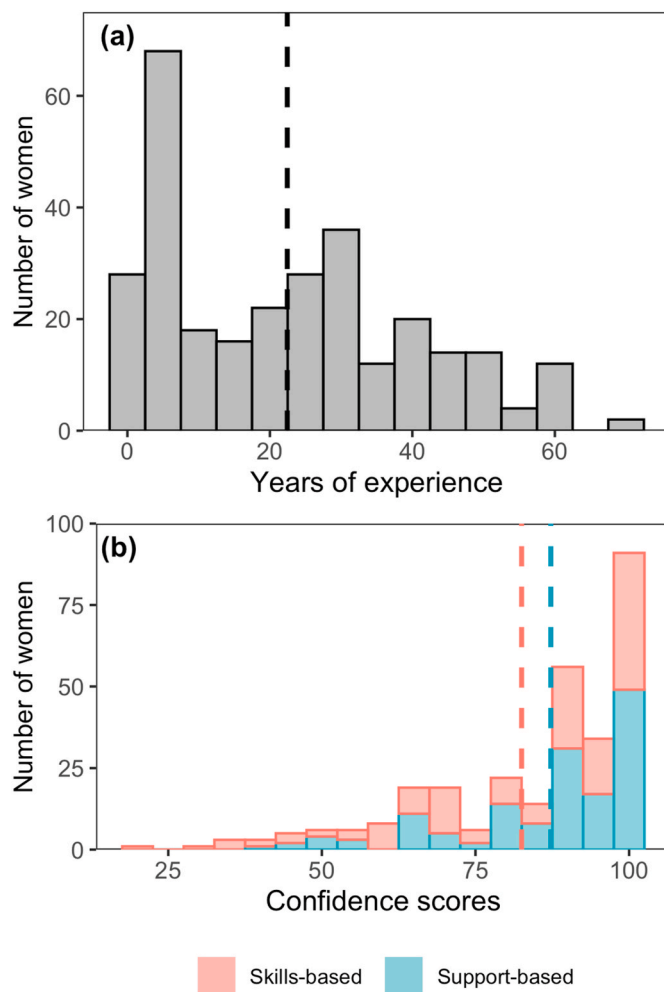


Fig. 2. Distribution of women's (a) years of experience and (b) confidence scores. Dashed lines show the means (M) for years of experience ($M = 22.4$), skills-based confidence ($M = 82.5$), and support-based confidence ($M = 87.3$).

confidence ($\beta = 0.21$, Table 3). In other words, the more experience a woman has hunting, the more confident she is. Furthermore, with every year hunting, women gained more confidence in their skills than their confidence based on social support. That being said, women in our study entered the sport with 13% more support-based confidence than skills-based confidence on average (see Table 4).

4. Discussion

Our objective in this research was to understand how key components that derive self-efficacy differ among women hunters with varying levels of hunting experience. By understanding whether—and when—skill development and social support contribute to bolstering confidence, managers can better identify what kinds of programs will be most effective in supporting both less and more experienced women hunters.

As one might expect, hunters with more experience have higher self-efficacy than less experienced hunters, which is essential for continued participation. However, for less experienced female hunters, both skill and social support are needed in order to develop self-efficacy. As women gain experience, their skills-based confidence increases; their support-based confidence also increases, but to a lesser degree. This result suggests that while skills-based interventions are needed for newer hunters, support-based interventions are needed for novice and experienced hunters alike. While it is possible this result reflects that adult female hunters who are new to the sport may already have a higher

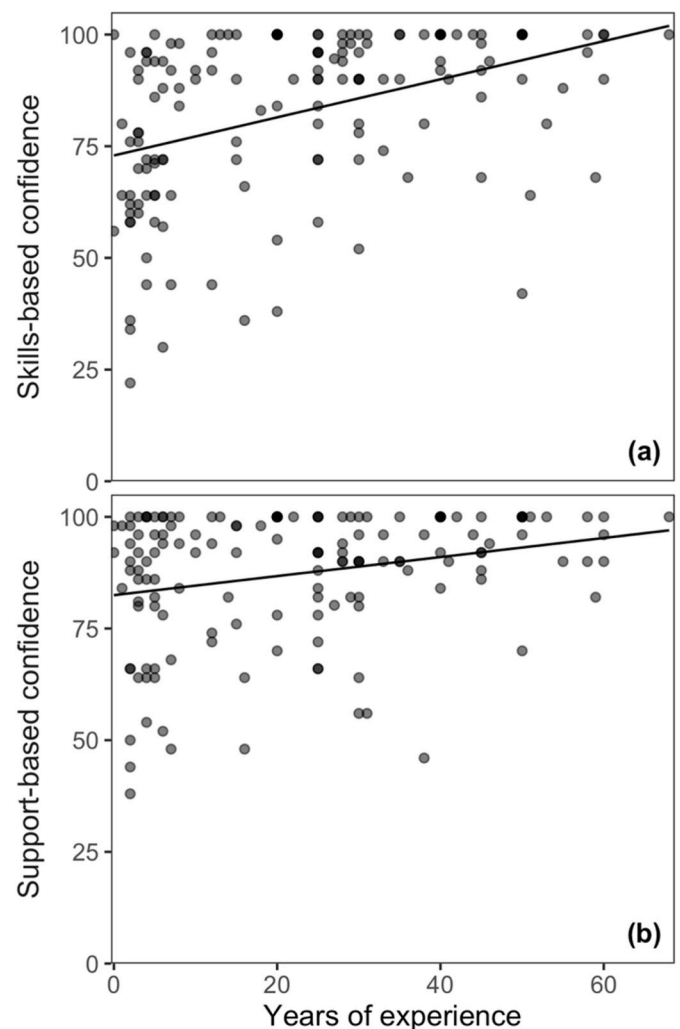


Fig. 3. Relationship between years of experience and a) skills-based and b) support-based confidence scores. Solid lines show the regressions (skills-based confidence = $0.43(\text{years}) + 72.93$; support-based confidence = $0.21(\text{years}) + 82.46$).

Table 3

Estimates and standard errors (SE) for models predicting skills-based and support-based confidence.

	Skills-based confidence	Support-based confidence
	Estimate (SE)	Estimate (SE)
Intercept	72.93 (2.3)	82.46 (1.92)
Years of experience	0.43 (0.08)	0.21 (0.07)

Table 4

Sample size (n), degrees of freedom (df), and adjusted R^2 for final models predicting skills-based and support-based confidence.

	Skills-based confidence	Support-based confidence
n	147	147
df	145	145
Adjusted R^2	0.15	0.058

level of support-based confidence than skill-based confidence (as we found in our sample, see Results), this would imply that it is also important to boost support-based confidence for hunting-curious

women (women who haven't participated yet), as it may result in more women joining the sport. In other words, for women hunters of all experience levels, our results show that self-efficacy is derived from more than just skill-development, but is inextricably tied to social influences such as feelings of belonging and confidence gained from having a network of immediate friends, family, and hunting partners and mentors for support.

These results may be useful to managers who are interested in moving beyond traditional methods of recruitment and retention strategies that make hunting attractive and accessible to female hunters. Managers may want to highlight aspects of camaraderie and network-building, in combination with other underlying motivations, such as food acquisition or to enjoy nature, identified by Gigliotti and Metcalf (2016) and Metcalf et al. (2015), as reasons to become involved. Interventions could be channelled through trainings in association with, or as a follow-up to hunter education, for example.

In addition, these results suggest it is important for managers to develop strategies that build self-efficacy for both newer and experienced female hunters. While confidence-building is harder to measure or evaluate than progress on "hard" skills such as rifle handling, target practice/accuracy, or field dressing skills, there are tangible ways to assess these more elusive or intangible attributes. Following sport psychology literature, programming to build confidence should start with a "bottom up" approach. In other words, confidence among female hunters will not arise out of a workshop on "confidence" itself, but rather the components that make up self-efficacy—skills and social support. Creating program around building solid foundations in both categories will serve to develop an overall sense of self-efficacy.

Skills-based confidence may arise out of programming that revolves around:

- A clear understanding of hunter safety, technical requirements of shooting and handling a rifle, how to read and understand hunting regulations, navigation and orienteering off-trail on private and public lands.
- Encouraging positive self-statements about the hunter's own ability to execute these technical skills/requirements 'in the field'.
- Access to and success during training experiences where technical skills can be achieved at a high level.

To address social support, the second dimension of self-efficacy, we suggest managers gear programming toward immersive, skills-based workshops that connect communities of hunters, particularly the community of female hunters, and are designed specifically with women's needs in mind. In a 2017 National Study on Women and the Outdoors, 63% of women said they could not think of an outdoor female role model. As the saying goes, "You can't be what you can't see." Additionally, six in ten women reported that men's interests in outdoor activities are taken more seriously than women's (REI, 2017). Subtle yet pervasive, gender socialization presents real barriers for women. As McNeil, Harris, and Fondren (2012, p. 41) write, "gender socialization regarding wilderness recreation is shaped by structural constraints, such as cultural beliefs about women's 'places' that can lead to overt or subtle gender bias that constrains some women's participation in these activities." Efforts to recruit and retain female hunters will require a broader culture and community ethic of empowering women in the outdoors as well as supporting women-to-women mentorship programs.

Social-support based confidence may arise out of programming (see Artemis, Backcountry Hunters & Anglers, State Wildlife Agencies) that fosters:

- Positive mentor/peer/educator *feedback* about technical ability (in rifle handling, butchering, orienteering, etc.)
- Positive experiences hunting with others
- Positive feelings of acceptance and belonging

- Increased representation of women hunters in outreach materials and other media and marketing platforms

We believe these suggestions may be helpful for programs aiming to recruit and retain female hunters by leveraging camaraderie and building networks as a reason to become involved.

Beyond the implications of this study, understanding women's participation in hunting deserves more attention among academic researchers and managers alike for *at least* four major reasons; 1) spending time in nature is linked to better health and well-being (Bedimo-Rung, Mowen, & Cohen, 2005; Doherty, Lemieux, & Canally, 2014); 2) outdoor recreation helps promote environmental awareness and behavior (Cocks & Simpson, 2015; Kil, Holland, & Stein, 2014); 3) hunting is a means to provide nutrient dense, and arguably more ethically harvested and sustainable meat than conventional animal agriculture for families (Ljung, Riley, Heberlein, & Ericsson, 2012; McCaulou, 2012; Pelligrini, 2011) and; 4) involving women in hunting has direct implications in the U.S. as an integral part of the North American Model for Conservation funding (Larson et al. 2014).

Today, wildlife and recreation agencies are interested in recruiting and retaining hunters primarily due to the significant financial contribution of hunting toward conservation and wildlife management. The recruitment of hunters remains important to maintaining healthy wildlife populations until, or if, the model for conservation funding is expanded to include new funding sources. In the US, the decline in the hunting population will continue until the perceived benefits of hunting outweigh perceived barriers. Of course, benefits are subjective; benefits for a trophy hunter are different than the perceived benefits of a hunter motivated by food. Thus, is important for managers to not only find ways to decrease the barriers related to self-efficacy, but to also align skill- and social support-based programming with women's motivations to hunt.

The perceived benefits of hunting especially influential for female hunters include a focus on hunting as a family-oriented activity and hunting as a way to provision food (Gigliotti & Metcalf, 2016). While the most discussed benefits of hunting in recruitment and retention programs are often conservation funding and game management, perhaps, as Organ and Fritzell (2000) suggest, tailoring communication and outreach toward female hunters would help gain the attention of women who are interested but not yet hunters (Organ & Fritzell, 2000). For example, communication could revolve around hunting as a way to provide a source of nutritious, sustainable, and ethically-sourced food. Family-oriented hunters may be interested in how connecting with nature may help prevent "nature-deficit disorder" among youth as society becomes increasingly absorbed by technology (Louv, 2005). For youth (and adults), connecting with nature has been proven to improve mental health, lower stress levels and enhanced cognitive skills (Berry, Repke, Metcalf, & Jordan, 2020; Norwood et al., 2019).

Future research should consider focusing on females who are beginning to hunt or have an interest in hunting, but have not yet started. A particular focus on this subset of the group would help managers create strategies for recruiting more females in the activity. Additionally, future research efforts could extend beyond just hunters and explore self-efficacy of women in other outdoor recreation activities like fly fishing, white-water boating, and horseback riding, among others.

This study has several limitations that should be noted. First, we acknowledge that there are limitations related to analyzing data that were collected in 2010. It is possible that in the past decade, there have been changes in skills-based confidence, support-based confidence, and/or overall self-efficacy among female hunters, particularly in light of recent efforts made by agencies and NGOs to address these needs. Future research is needed to gain insight into how self-efficacy among female hunters may have changed since 2010. However, given that female hunters remain a stark minority of the hunting population and that current programs implemented (and program participants themselves) often highlight the ongoing need for spaces designed specifically for women to develop skills and connect with one another, we believe there

is validity to the results and management implications of this study today. Moreover, the age of our data does not change the theoretical contribution we make to extend self-efficacy theory.

Second, our respondents report relatively high values for self-efficacy overall. These numbers are not a surprise, as we know that the majority of respondents are very experienced hunters who have already overcome barriers and constraints that would prevent them from getting into hunting initially. We recognize this potential avidity bias, however the high scores coincide with our findings that confidence is related to more years of experience hunting. Moreover, there were limitations regarding the database and funding available from our agency partners (Oregon Department of Fish and Wildlife) at the time we drew our sample. It is also possible that attrition also plays a role in self-efficacy. In other words, women who stay in hunting (and thus gain more experience) may already have more skills-based and support-based confidence. Given our data, it is not possible to disentangle attrition from experience, however, if women are dropping out of hunting because they lack skills-based and support-based confidence, we argue that the management implications for this study remain the same.

Third, in this article we found that there are at least two distinct components to self-efficacy/confidence for female hunters. However, there are likely others. We had a relatively low response rate and were not able to evaluate non-response bias due to cost constraints and age of data. Finally, the survey asked respondents about their sex, not gender. “Sex” refers to the biological aspects of being male or female, whereas “gender” encompasses the sociocultural dimensions of “roles, behaviors, activities, attributes and opportunities that any society considers appropriate for girls and boys, and women and men” (World Health Organization (WHO), 2020). In this way, gender interacts with, but is different from sex. Given this limitation, we urge US Fish & Wildlife and other government agencies to think beyond heteronormative approaches to collecting data regarding sex and gender. By only asking about sex, we exclude the possibility of understanding other important dimensions of diversity, gender equity and inclusivity.

5. Conclusion

In the U.S., female hunters remain a starkly underrepresented, but growing, constituent of the hunting population. Thus, there is a critical need to address recreation equity and inclusivity in hunting, particularly in light of the overall decline in the U.S. hunting population and its important role in the North American Model for conservation funding. Using existing literature on the constraints negotiation process associated with participation in leisure activities to ground this work, we looked specifically at the role of self-efficacy, or the belief we have in our own abilities, as it relates to female hunter participation. Our results show that as women gain experience, they are more confident in having the skills they need to hunt. However, there was less of a difference between novice and experienced women in their confidence to seek out or have available the social support and camaraderie needed to continue hunting. For managers seeking to recruit and retain female hunters, these findings speak to the need for programming that explicitly provides female hunters, regardless of skill level or experience, with avenues to build a social network for support. Thus, we suggest that managers find strategies that develop skills while also promote meaningful social connection and community-building to increase self-efficacy among female hunters across a spectrum of experience.

Female participation in hunting has direct implications in the U.S. for achieving recreation equity and is an integral part of the North American Model for conservation funding. For managers looking to recruit and retain female hunters, we suggest finding strategies that focus on building self-efficacy across a spectrum of experience. To address both the skill and social support dimensions of self-efficacy, we suggest managers promote immersive, skill-based workshops (e.g., hunter safety, rifle shooting and handling skills, butchering, navigation) that also connect female hunters with the hunting community, particularly

with other female hunters, providing them with a sense of acceptance and belonging (e.g., through hunter mentorship opportunities, community support networks, increased female leadership).

CRediT authorship contribution statement

Ada P. Smith: Conceptualization, Formal analysis, Writing. **Elizabeth Covelli Metcalf:** Conceptualization, Formal analysis. **Holly K. Nesbitt:** Formal analysis, Writing. **Hannah J. Leonard:** Visualization, Writing – review & editing. **Tina M. Cummins:** Writing – review & editing. **Alexander L. Metcalf:** Writing – review & editing. **Alan R. Graefe:** Writing – review & editing.

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