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"I Believe I Can and Should": Self-efficacy, Normative Beliefs and Conservation Behavior

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Abstract: This study examines the social-psychological drivers of conservation action among landowners in Minnesota. In particular, we apply an integrated norm activation theory to understand landowner conservation behavior. Data were collected through a self-administered mail survey of 3,000 landowners in La Crescent and Reno Watersheds in Southeastern Minnesota and analyzed using structural equation modeling. Study findings show that landowners' conservation action is driven by their feelings of personal obligation, and beliefs about whether one is capable of taking actions to influence outcomes (i.e., self-efficacy). Landowners who feel a sense of personal obligation and believe that their actions can make a difference are more likely to take conservation actions. Further, landowners who believe it is their personal responsibility to protect water and perceive social expectations are more likely to develop feelings of personal obligation. Importantly, this study highlights the role of self-efficacy as an activator of personal norm, as well as a driver of conservation behavior. Our study suggests that strategies that appeal to landowners' sense of personal responsibility and self-expectations, promote conservation action as a social norm, and build landowners' self-efficacy or confidence in their ability to make a difference, are likely to be successful.

Keywords: *water conservation, landowner behavior, norms*

Conservation professionals and environmental managers throughout the state of Minnesota invest considerable time and money on outreach, education, and technical assistance programs to promote conservation practice adoption and protect invaluable water resources. Despite these efforts, non-point source (NPS) pollution continues to be of significant concern across the state. Every county in the state has an impaired water body. Altogether, more than 5,000 water bodies are listed as impaired for one or multiple uses. This includes more than 1,800 impaired water bodies in the Upper Mississippi River Basin (MPCA 2016). The Upper Mississippi River Basin, which includes large portions of the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, provides life-sustaining ecosystem services for wildlife habitat, cultural preservation, public water supply, navigation, commerce, and recreation. Water impairments in the Upper Mississippi River Basin have significant impacts on ecosystem functioning and community well-being within Minnesota, as well as in downstream communities and the Gulf of Mexico (HTF 2018).

Research Implications

- Feelings of personal obligation and beliefs about one's ability to make a difference are key drivers of landowner conservation behavior.
- Study findings show that conservation outreach and programming that appeal to landowners' sense of responsibility and personal norms are likely to motivate landowners to take conservation action.
- Programs that build landowners' self-efficacy, or confidence in their ability to make a difference, also are essential to supporting and sustaining conservation behaviors.

Current approaches to managing NPS pollution in Minnesota and across the Midwestern U.S. rely predominantly on voluntary action of landowners, agricultural producers, residents,

and other resource users. How to best engage and inspire conservation action among key actors is a critical question for environmental management agencies and organizations (Nelson et al. 2017). Protecting and restoring water is particularly challenging in a state like Minnesota where 75% of its land is in private ownership. In Minnesota, Soil and Water Conservation Districts (SWCDs) and watershed districts (WDs) play a prominent role in private land conservation. SWCDs and WDs develop comprehensive plans, implement capital improvements, provide technical and financial assistance to landowners, and develop educational and outreach programs that promote natural resource conservation (MNBWSR 2019a; 2019b). WDs and SWCDs that work directly with landowners to install conservation practices largely rely on landowners to initiate the process. Thus, for these agencies and organizations, understanding landowners—what motivates and constrains their conservation decisions and actions—is essential to their work and to making programs and practices appealing.

Landowner conservation decision-making is complex, and there are no universal predictors or models for conservation action (Prokopy et al. 2008; 2019). Researchers have investigated the drivers of private-sphere (e.g., adoption of conservation practices) and public-sphere (e.g., civic engagement) conservation behavior. Past research has associated multiple types of variables, including land and landowner characteristics (e.g., land size, tenure, education, age, gender), and economic factors (e.g., income, land value) (Manzo and Weinstein 1987; Smith 1994; Koehler and Koontz 2008; Larson and Lach 2010; Prokopy et al. 2019) with behavior. Studies also have examined the social-psychological determinants of conservation action. Constructs such as environmental attitudes and awareness, perceived practice characteristics (e.g., Reimer et al. 2012; Arbuckle and Roesch-McNally 2015), attachment to land (e.g., Ryan et al. 2003), self-efficacy (e.g., Perry and Davenport 2020), values, and norms (e.g., Pradhananga and Davenport 2019) have been linked with conservation practice adoption. A review of qualitative studies examining motivations and barriers to conservation practice use identified several motivators including environmental awareness, concern, trust in information sources, and farmers' stewardship identity, as well as barriers such as negative perceptions about conservation practices and perceived risks of practice adoption (Ranjan et al. 2019). Similarly, increased levels of civic engagement and participation in conservation initiatives have been associated with feelings of personal responsibility (Story and Forsyth 2008), pro-ecological worldview and trust (Larson and Lach 2010), self-efficacy (Martinez and McMullin 2004), community attachment and environmental concern (Brehm et al. 2004; 2006; Pradhananga and Davenport 2017), and personal norm (Raymond et al. 2011; Pradhananga et al. 2015; 2017; Vaske et al. 2020). We build on this line of research by investigating the social-psychological drivers of conservation action among landowners in Minnesota. In particular, we examine conservation as an "other" interest or pro-social (as opposed to self-interest) behavior, and apply an integrated norm activation theory to understand landowner conservation behavior.

Normative Approach to Conservation Behavior

Theories such as the norm activation theory (NAT) posit that individual actions that have consequences for others are moral choice situations. In moral choice situations, feelings of personal obligation, or personal norm, strongly influence one's behavior. Individuals take actions that are consistent with their internal self-evaluations (Schwartz 1977).

According to moral approach theories such as the NAT and Value-Belief-Norm (VBN) theory (Stern 2000), values and beliefs activate personal norm, which influences behavior. This conceptualization of cognitions from values, beliefs, and norms to behavior is consistent with the cognitive hierarchy theory, which postulates that human cognitions are organized in a hierarchy from values to behaviors (Fulton et al. 1996). The specific beliefs that activate personal norm are awareness of consequences of one's actions or an environmental condition (i.e., awareness of consequences), and beliefs about responsibility for those consequences (i.e., ascription of responsibility) (Schwartz 1977; Stern 2000). There is ample empirical support for

the relationships posited in the NAT and VBN theory (Bamberg and Möser 2007). Studies have demonstrated the positive effect of personal norm in a wide range of behavioral contexts including water conservation (Harland et al. 2007; Landon et al. 2017), recycling (Nigbur et al. 2010), energy conservation (Ibtissem 2010), and willingness to accept climate change strategies (Nilsson et al. 2004). The NAT, VBN theory, and related concepts have also been applied in the context of landowner and farmer conservation behavior. Past work in this area has provided evidence to support links between personal norms and conservation practice adoption (Pradhananga and Davenport 2019), participation in conservation programs (Johansson et al. 2013), conservation of native vegetation (Raymond et al. 2011), and civic engagement in water management (e.g., Pradhananga et al. 2015; 2017). For example, a study of farmer conservation practice adoption in Minnesota reported that farmer personal norm was a direct predictor of practice adoption (Pradhananga and Davenport 2019). In a study of Swedish landowners, Nilsson et al. (2004) found that landowners who participated in forest preservation or wetland restoration programs reported higher levels of awareness of consequences, personal responsibility, and personal norm than those that did not participate. Johansson et al. (2013) reported that landowners who had participated in conservation programs were more aware of the consequences of threats to biodiversity, ascribed greater responsibility to themselves, and felt a personal obligation to participate in biodiversity conservation than landowners who did not participate. More recently, Vaske et al. (2020) found that normative beliefs influenced farmers' decisions to participate in conservation programs without compensation. Related constructs such as the "good farmer identity" (McGuire et al. 2015), particularly the conservationist identity, characterized by stewardship ethic and long-term environmental concern, have also been shown to be related to conservation behaviors (e.g., McGuire et al. 2015; Dixon et al. 2021). For example, a study of farmers in Iowa found that wildlife conservationist identity was significantly related to likelihood of wildlife management practice use (e.g., using weedy fencerows, avoiding mowing) (Dixon et al. 2021).

Research in this area has also explored the norm activation process, in particular the relationships among awareness of consequences, ascription of responsibility, and personal norm. The NAT also defines ascription of responsibility and personal norm as distinct constructs. While responsibility is a measure of one's "sense of connection or relatedness" to a situation or individual in need, personal norms are "directed toward the performance of specific acts" (Schwartz 1977, p. 246). Further, denial of responsibility can also act as a defense mechanism, even in situations where feelings of obligation are activated. Past work in this area has provided empirical evidence to suggest that ascription of responsibility and personal norms are distinct psychological constructs (e.g., Stern 2000; Harland et al. 2007). Applications of the VBN theory suggest a chain of relationships where awareness of consequences influences ascription of responsibility, which in turn affects personal norm (e.g., Stern 2000; De Groot and Steg 2009; Pradhananga et al. 2017). Thus, ascription of responsibility appears to be a more proximal determinant of personal norm than awareness of consequences.

Subjective norm, or social pressure to take action (Ajzen 1991) has been shown to influence conservation behaviors and behavioral intentions (e.g., Corbett 2002; Pradhananga et al. 2015; Ranjan et al. 2019; Knapp et al. 2020). People are more likely to take action if they believe that others important to them approve of that behavior (Ajzen 1991). Studies have provided empirical support for the relationship between subjective norms and landowner conservation behavior. For example, in a study of private landowners in Texas, Sorice and Conner (2010) reported a significant influence of subjective norm on landowners' intentions to enroll in an incentive program to protect endangered species. A study of cattle ranchers also found that subjective norm was a significant predictor of intentions to engage in wildlife management (Willcox et al. 2012). Vaske et al. (2020) reported a significant influence of subjective norm on Illinois farmers' intention to participate in conservation programs. While a meta-analysis of studies applying the Theory of Planned Behavior (TPB) to environmental behavior found generally weak relationship between subjective norm

and behavioral intention (Armitage and Conner 2001), other studies have provided support for the influence of subjective norms on personal norms and behavior (Bamberg and Möser 2007; Klöckner 2013). While not explicitly included in the NAT, Schwartz (1977) suggests that subjective norms may be internalized as personal norms, which in turn influence behavior. Literature in this area suggests that the extent of social pressure one feels to take actions such as using conservation practices can have an influence on feelings of personal obligation and intentions to take action.

Self-efficacy and Behavior

In the social cognitive theory, Bandura (1977; 2001) argues that human agency is characterized by beliefs about one's capability to achieve goals or outcomes, also defined as self-efficacy. Self-efficacy represents human capacity of self-reflectiveness to evaluate their own motivations and values. Beliefs about one's efficacy influences "how people feel, think, and act" (Bandura 1990, p. 128). Beliefs about whether or not one is capable of taking actions affect what actions people take and how much effort they put into performing a behavior (Bandura 2001). In the context of landowner conservation behavior, confidence in one's ability to use conservation practices (i.e., self-efficacy) can be expected to affect an individual's intentions to take conservation action.

Research has consistently linked self-efficacy with behaviors related to public health (e.g., health promotion, disease prevention, physical activity) (Bandura 1998; Plotnikoff et al. 2008). While not extensively applied to environmental behaviors, a subset of studies have linked self-efficacy with environmental behaviors such as recycling (e.g., Tabernero and Hernandez 2011), transportation choice (e.g., Jugert et al. 2016), invasive species management (e.g., Clarke et al. 2021a; 2021b), and landowner conservation behavior (e.g., Wu and Mweemba 2010; Perry and Davenport 2020). For example, a study of residents in Spain (Tabernero and Hernández 2011) reported that residents who perceived a greater capacity to recycle (i.e., higher levels of self-efficacy) engaged in more recycling behaviors. Self-efficacy has also been found to be positively associated with intentions to conserve energy (Lee and Tanusia 2016), and support for biodiversity (Clayton et al. 2017). A qualitative assessment of farmer decision-making identified low levels of perceived self-efficacy as a significant barrier to conservation agriculture (Perry and Davenport 2020). A study of farmers in Iran reported a significant effect of self-efficacy on farmers' water conservation behavior (Yazdanpanah et al. 2015). Studies of family forest owners have also reported a significant influence of self-efficacy on their intentions to engage in invasive plant management (Clarke et al. 2021a; 2021b).

While self-efficacy has not been applied extensively to landowner conservation behavior, two related constructs, perceived ability and perceived behavioral control, have received much attention. Perceived ability, or perceptions about the availability of resources to take action (Schwartz 1977), and perceived behavioral control (i.e., perceptions about the level of ease or difficulty of performing a behavior) (Ajzen 1991) have been shown to affect conservation action (Harland et al. 2007; Chan and Bishop 2013; Pradhananga et al. 2017; Scalco et al. 2017; Wilson et al. 2018; Pradhananga and Davenport 2019) as well as personal norm (Pradhananga et al. 2015; Pradhananga and Davenport 2019). In the NAT, ability to take action is postulated as a necessary precondition for the activation of personal norms. Feelings of personal obligation to take action, or personal norms, are more likely to be activated if one believes that they have the ability to take such action. Further, denial of ability may neutralize personal norms even when they have been formed (Schwartz 1977).

While perceptions about the ease or difficulty of taking an action may affect confidence in one's ability to attain outcomes (i.e., self-efficacy), self-efficacy and perceived behavioral control are distinct constructs. Self-efficacy is a broader concept that incapsulates the idea of perceived ability to act (e.g., use conservation practices) to attain certain outcomes (e.g., improve water quality). Constructs such as self-efficacy, perceived ability, and perceived behavioral control are useful in understanding factors that may constrain conservation norms and behaviors. In the current paper, we integrate self-efficacy in

the NAT to examine the relationships among self-efficacy, personal norm, and behavioral intention, in the context of water resource management. Specifically, in this study's conceptual model (Figure 1), we hypothesize that personal norm will have a positive influence on intended conservation behavior. Self-efficacy, ascription of responsibility, and subjective norm are hypothesized as positive predictors of personal norm.

Methods

We administered a mail survey with 3,000 landowners, including agricultural landowners in La Crescent and Reno Watersheds in southeastern Minnesota. The sampling frame was generated using a list of property owners obtained from Winona and Houston Counties' publicly available landowner parcel data. The sample consisted of Winona and Houston County landowners who live within the two study watersheds. A random sample of 1,500 landowners from each watershed were selected for survey mailing. An adapted Dillman et al. (2014) Tailored Design Method was used to increase response rate, and included three waves of mailing. Each mailing included a questionnaire, cover letter, map of the watershed, and a postage-paid envelope. The surveys were administered from March to July 2018.

The questionnaire inquired about landowners' beliefs about water pollution, perspectives on water management, engagement in conservation behaviors, and sociodemographic information. The survey questionnaire was designed based on past research, particularly around conservation behavior in the Midwest (Prokopy et al. 2008; Pradhananga et al. 2015; Pradhananga and Davenport 2019).

Study Site

The Mississippi River-La Crescent Watershed stretches across Winona and Houston Counties. Pine Creek is the largest stream in the watershed (MPCA 2018a). The major land cover in the watershed is forest (47%), with 27% of the watershed in cropland (MNDNR 2015a). Major resource concerns in the watershed include soil erosion, total suspended solids, low dissolved oxygen, nitrate, and degradation of stream habitat (USDA NRCS 2007; MPCA 2018b). Stretches of the Pine Creek and Mississippi River are listed as impaired due to *Escherichia coli* and polychlorinated biphenyl (PCB) (MPCA 2016). The Mississippi River-Reno Watershed is located entirely in Houston County. Crooked Creek and Winnebago Creek are the largest streams in the watershed (MPCA 2018a). The major land cover in the watershed is cropland (42%), followed by forest (37%) (MNDNR 2015b). Soil loss and

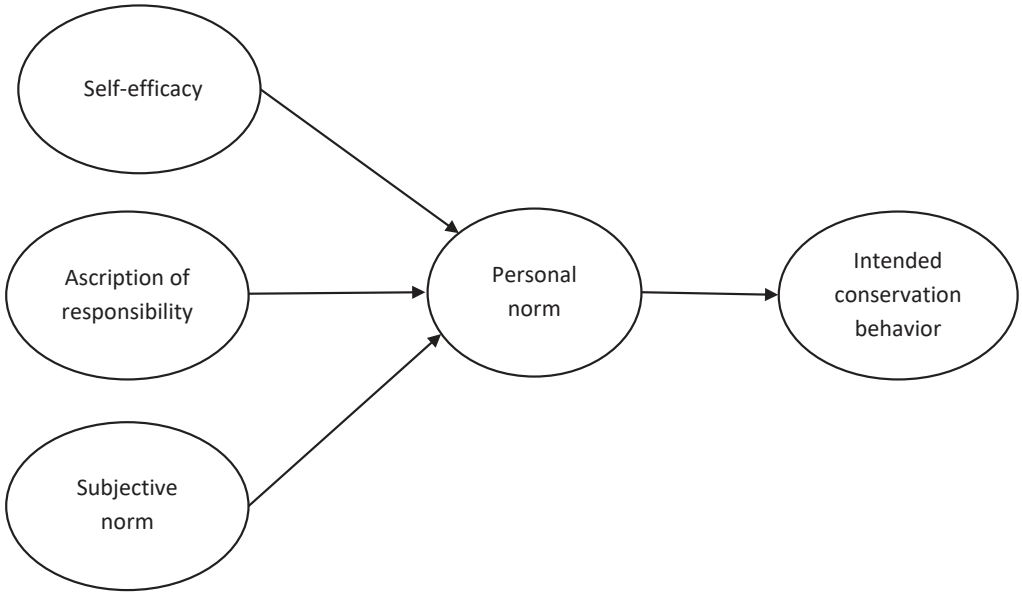

Figure 1. Study conceptual model.

oxygen depletion are major resource concerns in the watershed (USDA NRCS 2008). Stretches of Crooked Creek and Winnebago Creek are listed as impaired for *E.coli* and aquatic macroinvertebrate bioassessments (MPCA 2016). Residents in the Houston and Winona Counties are predominantly White (97% and 94%, respectively) and non-Hispanic (U.S. Census Bureau 2019, American Community Survey 5-year estimates). Median age varies; Winona County residents (Med = 35) overall are younger than Houston County residents (Med = 45), and gender identity reported is evenly split between male and female. About 25% of residents in Houston County and 30% of residents in Winona County have a Bachelor's degree or higher, and median income is about $60,000 in each county (Table 1).

Measures

Ascription of responsibility was measured using two items adapted from Pradhananga et al. (2019). An example item measured is "It is my personal responsibility to help protect water." Respondents were asked to rate two statements on a five-point Likert type scale from strongly disagree (-2) to strongly agree (+2). ***Subjective norm*** was measured using two items based on suggestions from Ajzen (1991) and adapted from past empirical work (e.g., Karppinen 2005; Bernath and Roschewitz 2008; Pradhananga et al. 2015). Items included "People who are important to me expect me to use conservation practices on my land" and "People who are important to me expect me to maintain my land/farm in a way that does not contribute to water resource problems." Respondents rated each statement on a five-point Likert type scale from strongly disagree (-2) to strongly agree (+2). ***Self-efficacy*** was measured using three items rated on a four-point scale from not at all capable (0) to very capable (3). Following recommendations from Bandura (2006) and adapted from an application in a study about recycling (Tabernero and Hernández 2011), the response scale was developed as a unipolar scale. The question stem was framed as "To what extent do you believe you are capable of the following?" The items included "Using a new conservation practice on the land/farm," and "Changing land use practices to reduce impacts on water resources." ***Personal norm*** was measured using three items adapted from past applications of normative theories to conservation behavior (e.g., Harland et al. 2007; Pradhananga et al. 2015; 2019). Respondents rated each statement on a five-point Likert type scale from strongly disagree (-2) to strongly agree (+2). An example item is "I feel a personal obligation to use conservation practices on my land/property." ***Intended conservation***

Table 1. Study area demographic characteristics.

		Houston	Winona
Gender:	Male	50.2%	49.5%
	Female	49.8%	50.5%
Origin:	Hispanic or Latino	1.1%	3.0%
Race:	White alone	96.9%	93.6%
	Other races	2.2%	4.7%
	Two or more races	0.9%	1.7%
Age:	Median (of all resident population)	45.3	35.2
	65 years and over (of 18 and over population)	26.5%	20.0%
Education:	Bachelor's degree or higher	24.8%	30.1%
Income:	Median income	$60,382	$59,329

Source: U.S. Census Bureau, 2019 American Community Survey 5-year estimates.

behavior was measured using two items on a five-point scale from most certainly not (-2) to most certainly will (+2). Intentions to engage in two behaviors were measured: "Use a new conservation practice on my land," and "Contact conservation assistance professionals about water resource initiatives."

Analysis

Convergent and discriminant validity were assessed using composite reliability and average variance extracted (AVE) (Fornell and Larcker 1981). AVE scores greater than 0.5, and composite reliability greater than 0.7 indicate adequate convergent validity (Raykov 1997; Hair et al. 2010). Discriminant validity is achieved if the correlations between latent constructs do not exceed the square root of AVE for either construct in the pair being compared (Fornell and Larcker 1981).

We used structural equation modeling to test the hypothesized relationships in the conceptual model (Figure 1). Model fit was examined by assessing several model fit indices. We considered the model to have adequate fit to the data if it had a relative chi-square (χ^2/df) of five or less (Schumacker and Lomax 2004), a root mean square error of approximation (RMSEA) less than 0.07 (Steiger 2007), standardized root mean square residual (SRMR) less than 0.08 (Hu and Bentler 1999), and incremental fit index (IFI) greater than 0.95 (Kline 2016). The model was estimated using the full information maximum likelihood method in LISREL 8.80.

We conducted mediation analysis to assess the direct and indirect effects of the exogenous variables (i.e., ascription of responsibility, subjective norm, and self-efficacy) on intended conservation behavior (Hayes 2013). The indirect effect of each exogenous variable on intentions for conservation behavior was calculated as the product of the predictor's (i.e., ascription of responsibility, subjective norm, self-efficacy) effect on the mediator (i.e., personal norm), and the mediator's effect on the criterion variable (i.e., intended conservation behavior). The Sobel test (Sobel 1986) was used to determine if the indirect effects were significant.

Results

Response Rate and Respondent Profile

Overall, 597 landowners completed the survey for a response rate of 23%. Response rates were 23% in La Crescent and 21% in Reno Watersheds.

Most respondents in both La Crescent (77%) and Reno (80%) Watersheds identified as male. A vast majority of respondents characterized their race and ethnicity as White (La Crescent: 98%, Reno: 92%). Median age among La Crescent (48% 65 years of age and over) and Reno (45% 65 years of age and over) Watershed respondents was 65 and 64, respectively. Almost half of the respondents in La Crescent Watershed (42%), and about one-third of respondents in Reno Watershed (35%) had attained at least a college bachelor's degree. A majority of respondents (59%) reported an annual household income of $75,000 or more in La Crescent, and 48% of Reno Watershed respondents reported an annual household income of $75,000 or more. Most respondents in La Crescent (82%) and Reno (66%) Watersheds did not use their land for agricultural production.

Comparisons with census statistics reveal that the survey respondent sample includes higher proportions of older adult (65 years of age and over) and of male-identifying residents than those residing in the two counties (Table 1). Demographic statistics also suggest that survey respondents overall have higher formal education attainment and income than area residents. Though these differences are consistent with other studies using similar sampling frames in rural areas (i.e., county property owner identification lists), it is important to acknowledge that the voices of residents who are younger, identify as female, or have lower household incomes are underrepresented in this study.

A majority of respondents believed that they are moderately to very capable of using a new conservation practice (57%) and maintaining conservation practices (70%) on their land/farm. A vast majority of respondents somewhat to strongly agreed that it is their personal responsibility to help protect water (88%), and to make sure that what they do on their land does not contribute to water resource problems (89%). Most respondents somewhat to strongly agreed that people who are important to them expect them to use conservation practices on

their land (60%), and maintain their land in a way that does not contribute to water resource problems (72%). A majority of respondents also agreed that they feel a personal obligation to do whatever they can to prevent water pollution (84%), maintain their land/farm in a way that does not contribute to water resource problems (85%), and use conservation practices on their land/property (76%). Intentions of conservation behavior, however, were generally low. Only about a quarter of respondents reported that they probably to most certainly will use a new conservation practice on their land (26%), and fewer reported that they probably or most certainly will contact conservation assistance professionals about water resource initiatives (16%). While intentions to engage in conservation behaviors are low in the study watersheds, it must be noted that only 28% of La Crescent Watershed and 34% of Reno Watershed respondents reported that they used their land for agricultural production. Further, most of the outreach from conservation assistance professionals such as SWCDs in the study area focuses on farmers, rather than non-farm landowners. These factors may explain the low levels of intentions among survey respondents. The survey also inquired about landowners' current use of conservation practices. Most respondents reported using practices such as "using fertilizers/ pesticides on lawns and gardens at recommended rates" (80%) and "planting trees as windbreak on land/property" (72%). Smaller proportions of respondents reported using practices such as "rain barrel or cistern to store water" (25%), and "rain garden" (15%). However, not all practices (e.g., cover crops and conservation tillage) are applicable to all landowners surveyed.

Structural Equation Modeling

Composite reliability exceeded the threshold of 0.7 for all latent constructs. Factor loadings of observed measures on latent constructs ranged between 0.71 and 0.91 (Table 2). The AVE of latent constructs ranged between 0.55 and 0.81. AVE square root scores of all latent constructs were greater than factor correlations between pairs of latent constructs (Table 3). These results demonstrate acceptable convergent and discriminant validity. These findings demonstrate that the latent constructs in the conceptual model, including ascription of responsibility and personal norms are distinct constructs.

The structural model with ascription of responsibility, subjective norm, and self-efficacy as exogenous variables, and personal norm and intended conservation behavior as endogenous variables demonstrated adequate model fit (Figure 2). Relative chi-square of the model was less than 5 ($\chi^2/df = 2.45$). RMSEA value was below the threshold of 0.07 (RMSEA = 0.049, 90% confidence interval: 0.038-0.061). IFI was 0.98, above the 0.95 threshold. The paths from self-efficacy ($\beta = 0.17$, $t = 3.83$), ascription of responsibility ($\beta = 0.38$, $t = 6.70$), and subjective norm ($\beta = 0.24$, $t = 4.58$) to personal norm were statistically significant. Personal norm was a statistically significant positive predictor of intended conservation behavior ($\beta = 0.22$, $t = 3.20$). Self-efficacy also had a direct and positive effect on intended conservation behavior ($\beta = 0.20$, $t = 3.52$). The model explained 18% of the variance in intended conservation behavior, and 40% of the variance in personal norm. The statistically significant indirect effects of the exogenous variables, ascription of responsibility, subjective norm, and self-efficacy on intended conservation behavior suggest that the relationship between the exogenous variable and intended conservation behavior is mediated by personal norm (Table 4). However, we also found that the direct effect of self-efficacy on intended conservation behavior was significant. This suggests that the effect of self-efficacy on intended conservation behavior is not completely mediated by personal norm.

Discussion

This paper contributes to the body of knowledge supporting a normative basis for pro-environmental behavior and arguing that self-interest alone does not fully capture what compels landowners to take conservation action. In this study we used an integrated norm activation model to examine landowner personal norms and conservation behaviors. Specifically, we investigated the influence of self-efficacy, personal responsibility, and subjective norms on respondents' personal norms and ultimately, their intentions to take conservation action. Findings indicate that landowners who feel a personal moral obligation to protect water have

Table 2. Descriptive statistics, reliability analysis, and factor loadings of items measuring constructs in the structural model.

Latent Variable	Survey Item	Mean*	SD	Factor Loadings (λ)	Composite Reliability (ρ)
Ascription of responsibility[a]	It is my personal responsibility to help protect water	1.36	0.82	0.78	0.81
	It is my personal responsibility to make sure that what I do on the land doesn't contribute to water resource problems	1.45	0.78	0.87	
Subjective norm[a]	People who are important to me expect me to use conservation practices on my land	0.75	0.88	0.89	0.90
	People who are important to me expect me to maintain my land/farm in a way that does not contribute to water resource problems	0.95	0.86	0.91	
Self-efficacy[b]	Using a new conservation practice on the land/farm	2.64	1.04	0.92	0.91
	Maintaining conservation practices on the land/farm	2.92	1.03	0.85	
	Changing land use practices to reduce impacts on water resources	2.65	1.07	0.85	
Personal norm[a]	I feel a personal obligation to do whatever I can to prevent water pollution	1.28	0.85	0.85	0.88
	I feel a personal obligation to maintain my land/farm in a way that does not contribute to water resource problems	1.34	0.88	0.90	
	I feel a personal obligation to use conservation practices on my land/property	1.09	0.94	0.78	
Intended conservation behavior[c]	Use a new conservation practice on my land	-0.13	1.05	0.78	0.71
	Contact conservation assistance professionals (e.g., my soil and water conservation district or the Natural Resources Conservation Service) about water resource initiatives	-0.39	0.98	0.70	

[a]Variables measured on a 5-point scale from *strongly disagree* (-2) to *strongly agree* (2). [b]Variables measured on a 4-point scale from *not at all capable* (0) to *very capable* (3). [c]Variables measured on a 5-point scale from *most certainly not* (-2) to *most certainly will* (2). SD = Standard Deviation.

stronger intentions to take actions, or in our case, to use a new conservation practice on their land and to contact conservation professionals about water resource initiatives. These findings confirm past research demonstrating a link between personal norms and pro-environmental behaviors in a wide range of behavioral contexts (Bamberg and Möser 2007), including farmer conservation behavior (Pradhananga and Davenport 2019), household water use (Harland et al. 2007), and household sanitation (Poortvliet et al. 2018). Our study results are important to conservation professionals because they offer evidence that protecting water is viewed by many landowners as a self-expectation, a moral obligation. For these individuals, protecting water is consistent with the concept of "self" and evokes positive self-evaluations (Schwartz 1977). Research examining farmers' identity has also shown that farmers with a conservationist or stewardship identity are more likely to engage in conservation behaviors (e.g., McGuire et al. 2015; Dixon et al. 2021).

Personal norms are also significant because the study shows they fully mediate the effect of responsibility and perceived social expectations (i.e., subjective norms) on conservation behaviors. In other words, the two antecedent beliefs, responsibility and perceived social expectations, do not directly influence intentions to act. They must first be internalized or activated as self-expectations to protect water and ultimately as intentions to act. Programs that appeal to landowners' sense of personal responsibility and promote conservation as a social norm are likely to activate feelings of personal obligation, which in turn affects conservation behavior.

Of the three antecedent beliefs in the model, ascription of personal responsibility had the

Table 3. Discriminant validity matrix.

Constructs[a]	AR	SE	SN	PN	ICB
AR	**0.83** (0.69)				
SE	0.39	**0.87** (0.76)			
SN	0.57	0.34	**0.90** (0.81)		
PN	0.58	0.39	0.51	**0.84** (0.71)	
ICB	0.32	0.34	0.33	0.38	**0.74** (0.55)

[a]AR = Ascription of responsibility; SE = Self-efficacy; SN = Subjective norm; PN = Personal norm; CB = Conservation behavior. Note: Off-diagonal elements are correlations between constructs. Diagonal elements (bold) are the square root of average variance extracted (AVE) between the constructs and their indicators (AVE scores in parentheses). To meet the criteria for discriminant validity, off-diagonal elements should be less than 0.85 and AVE square root scores should be larger than correlations in the same row and column.

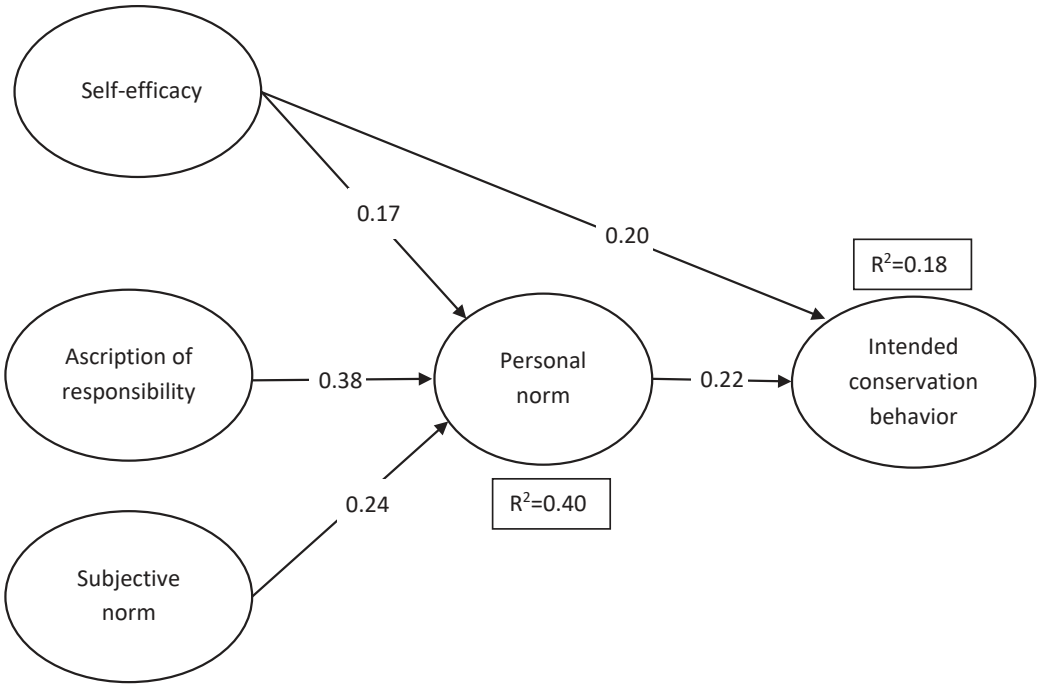

Figure 2. Standardized solution for structural model of beliefs, personal norms, and intended conservation behavior. Only statistically significant ($p \leq 0.05$) paths shown in figure. Chi-square (χ^2, $df = 44$) = 107.90; $\chi^2/df = 2.45$; Root Mean Square Error of Approximation (RMSEA) = 0.049 (90% CI: 0.038-0.061); Incremental Fit Index (IFI) = 0.98.

Table 4. Indirect effects of self-efficacy, ascription of responsibility, and subjective norm on landowners' intended conservation behavior.

Indirect Effect	Product of Unstandardized Coefficients	Z-statistic	p-value
SE[a]→PN[b]→ICB[c]	0.04	2.527	0.011*
AR[d]→PN→ICB	0.08	2.815	0.005*
SN[e]→PN→ICB	0.05	2.629	0.008*

[a]Self-efficacy; [b]Personal norm; [c]Intended conservation behavior; [d]Ascription of responsibility; [e]Subjective norm; *Statistically significant ($p \leq 0.05$).

biggest effect on personal norms. This finding is consistent with past applications of moral theories (e.g., NAT and VBN) which purport that feeling personally responsible for addressing a problem activates personal norms to take action (Stern et al. 1999; Harland et al. 2007; Pradhananga and Davenport 2019). In our study, landowners who believe it is their personal responsibility to protect water have higher self-expectations to take action.

Subjective norms, or perceived social expectations, also influence personal norms. Schwartz (1977) argues that behavioral norms shared by members of a group become self-expectations for individual group members as they are "learned" through social interactions (p. 231). This study's findings lend further credence to the subjective norm internalization process posited by Schwartz (1977) and are consistent with more recent research reporting a positive effect of social norms on personal norms in multiple behavioral contexts including landowner conservation behavior (Bamberg and Möser 2007; Klöckner 2013; Pradhananga et al. 2015). Importantly, our study conceptualized social norms as the expectations of people *important* to the respondent, assuming that important people, rather than society at large, have a bigger effect on personal norm development. For example, the broader farming community may not have established social norms for conservation. Yet, normative influences of *important* others such as family and like-minded conservationist farmers may influence norm activation among farmers.

A unique contribution of our work is the inclusion of the concept self-efficacy as an antecedent belief in the model. This approach is consistent with Bandura's (2001) social cognitive theory and Schwartz's (1977) NAT. Findings here demonstrate the role believing in one's ability to make a difference has in developing a personal norm and taking action to protect water. We found that self-efficacy has a direct effect on behavioral intention, as well as an indirect effect through personal norms. The effect of self-efficacy on personal norms is consistent with the norm activation process outlined in the NAT which suggests that perceived ability activates personal norms (Schwartz 1977). Lack of ability may also have a "neutralizing" effect on personal norms (Schwartz 1977, p. 246). Even when personal norms are activated, without the ability to take action, individuals may not be able to follow through on their feelings of obligation, which can result in negative self-evaluations. Further, the NAT also suggests that personal norms are activated when individuals believe that there are actions that can address a problem. This study shows that self-efficacy, or perceptions of one's ability to take action (e.g., use conservation practices) to meet certain outcomes (e.g., improve water quality) (Bandura 2001) also activates personal norms for water protection. Landowners are more likely to feel a sense of personal obligation to take action if they believe that they are capable of taking actions that are effective at addressing water resource problems.

Past studies have reported links between high levels of self-efficacy and pro-environmental behaviors including recycling (Tabernero and Hernández 2011), energy conservation (Lee and Tanusia 2016), support for biodiversity (Clayton et al. 2017), farmer decision-making (Perry and Davenport 2020), and landowner engagement in invasive species management (e.g., Clarke

et al. 2021a; 2021b). Perceptions about whether one is capable of influencing outcomes not only affect behavioral choices, but also the amount and persistence of effort one is willing to put into the behavior (Bandura 2001). When people perceive that they do not have control over outcomes, they are less likely to take action and exert high or persistent effort into taking action (Bandura 2001). Adopting a new conservation practice is considered a "high-cost" pro-environmental behavior (Esfandiar et al. 2020), suggesting that it requires considerable time, money, and effort to undertake. Thus, the sentiments, "I believe I can" and "My actions will make a difference" become crucibles of conservation action. Two distinct dimensions of self-efficacy are essential to behavior: perceived ability to perform a conservation practice (e.g., Pradhananga et al. 2015) and perceived efficacy of the practice itself to ameliorate the problem. Besides attenuating action, low self-efficacy beliefs can lead to feelings of frustration, guilt, and hopelessness (Perry and Davenport 2020). Higher levels of self-efficacy, on the other hand, can lead to landowner engagement in actions to protect natural resources (e.g., Clarke et al. 2021a; 2021b).

One limitation of this study is that we focus on behavioral intentions and not behaviors. While intentions to act are positively correlated with actual behaviors, studies have also noted inconsistencies between intentions and behaviors (e.g., Sheeran and Webb 2016). Further, we did not account for the influence of past or current use of conservation practices on landowners' intentions to use conservation practices in the future. Opportunities for future research exist in examining the influence of past use of conservation practices on landowners' beliefs and intentions to use conservation practices in the future.

From a practical perspective, this study makes several key assertions that inform conservation programming. First, personal ethics are major drivers of conservation behavior. Conservation programs that focus solely on self-interest appeals, conventional science communication, and incentives like technical and financial assistance, may not have the return on investment intended, especially for those whose decisions hinge on feeling personally responsible for water protection, believing neighbors or local officials expect them to take action, or knowing they can make a difference in water outcomes. Second, low self-efficacy is doubly important as both a constraint to feeling morally obligated to act and as a barrier to the behavior itself, even when feelings of obligation exist. Not knowing how to take action, not believing one has the ability to take action, and not feeling that the action will make a meaningful difference are potentially high hurdles for conservation programming to overcome.

Our study suggests that strategies that appeal to landowners' sense of personal responsibility and self-expectations, promote conservation action as a social norm, and build landowners' self-efficacy, or confidence in their ability to make a difference are essential to supporting and sustaining conservation behaviors. Since beliefs about personal responsibility and social expectations do not have direct effect on intentions to engage in conservation, strategies that emphasize the activation of norm are more likely to be successful. Studies examining a range of norm-based intervention strategies such as benchmarking and commitment have shown to be effective in inspiring behavior change (Abrahamse et al. 2005; 2007; de Snoo et al. 2010). Research shows that benchmarking, or providing feedback about one's behaviors and the actions others are taking, leads to normative pressure to keep up with others (Abrahamse et al. 2005; de Snoo et al. 2010; 2013; Lokhorst et al. 2010). For example, applications of benchmarking to farmer behavior have shown that farmers who received feedback comparing their conservation actions with others spent more time on conservation (e.g., de Snoo et al. 2010). In La Crescent and Reno Watersheds, providing feedback to landowners about their use of conservation practices compared to their neighbors may be useful in promoting social norms of conservation and increasing landowner engagement in conservation.

Commitment-making, or asking people to commit to taking action can activate personal norms in a decision-making situation (McKenzie-Mohr 2000; Lokhorst et al. 2010). Research in this area has found that benchmarking, along with commitment can influence farmers' engagement in conservation (e.g., de Snoo et al. 2010; Lokhorst et al. 2010). Further, asking landowners to make small

commitments such as contacting conservation professionals can lead to participation in more substantial activities such as conservation programs (Kennedy 2010). A critical practical question for conservation educators, extension agents, and field staff is "Who are the important people with influence on landowners' self-expectations and conservation decision-making?" This survey effort (Pradhananga et al. 2019) and other similar studies (e.g., Pradhananga et al. 2014; 2018) of Minnesota landowners reveal that family members, neighbors, and local conservation agencies are among the most influential groups when conservation decisions are made. Knowing those influential referent groups and engaging them in community-centered conservation program development and implementation is likely to make a difference.

Finally, this study shows that programs to build landowners' self-efficacy are needed to promote conservation behaviors. Bandura (2012) outlines four main sources of self-efficacy: 1) enactive experiences (e.g., mastery, resiliency), 2) vicarious experience (e.g., social models of success), 3) social persuasion (e.g., reinforcement of positive self-image and reduction of self-doubt), and 4) emotional and physical states. More recently, Perry and Davenport (2020) identified sources of farmers' self-efficacy to engage in conservation agriculture. The authors identified personal achievement in soil conservation and precision agriculture, observing others' success, and peer feedback as primary sources of self-efficacy. Feedback plays a critical role in building self-efficacy. Feedback that highlights social models of success can be a useful tool to enhance landowners' self-efficacy. For example, strategies such as sharing success stories of water protection can help establish conservation as a community norm and build landowners' self-efficacy. Programs and communication campaigns that provide social and ecological feedback about the outcomes of conservation practices (e.g., erosion control, water quality improvements) are strategies to build self-efficacy. Providing honest and localized social and biophysical feedback about conservation practice impacts, including benchmarking to demonstrate what others are doing and their successes and challenges creates transparency and enables community-driven dialogue.

Conclusion

Study findings show that landowners' conservation action is driven by their feelings of personal obligation, and beliefs about whether one is capable of taking actions to influence outcomes (i.e., self-efficacy). Landowners who feel a sense of personal obligation and believe that they can take actions that can make a difference are more likely to take conservation actions. Further, landowners who believe it is their personal responsibility to protect water and perceive social expectations are more likely to develop feelings of personal obligation. Importantly, this study highlights the significance of self-efficacy as an activator of personal norm, as well as a driver of conservation behavior.

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