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Normative Influences on Farmers' Intentions to Practice Conservation Without Compensation

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Abstract

Non-source nutrients (e.g., nitrogen, phosphorous) from agriculture have created a massive hypoxic zone in the Gulf of Mexico. This zone contains no oxygen and is devoid of life. US Department of Agriculture programs provide direct payments to farmers to encourage adoption of practices that reduce nutrient pollution. Paying farmers to change behavior, however, is expensive. Personal and social norms may serve to reduce these payment costs by motivating farmers to take action without external reward. This study explored relationships between three normative concepts (awareness of consequences (AC), ascription of responsibility (AR), subjective norms (SN)) and Illinois farmers' intention to continue participation in conservation without financial compensation. Data were obtained from a mailed questionnaire. Only farmers who were currently being paid to participate in a conservation program were included in the analysis ($n = 551$). Using norm activation theory and the theory of reasoned action, we hypothesized that SN would be positively related to AC, AR, and conservation intentions without compensation. We also predicted that AC would be positively related to AR, and that AC and AR would be positively related to conservation intentions. All hypotheses were supported. Both personal norms (AC, AR) and social norms (subjective norms) were related to intentions to continue conservation without pay. Behavioral interventions that activate norms may help facilitate conservation without payments. As applied in this study, activating personal and social norms may serve to reduce nutrient pollution from agriculture that is flowing into the Gulf of Mexico and resulting in the hypoxic zone.

Keywords Subjective norms · Awareness of consequences · Ascription of responsibility · Payment for conservation

Introduction

Farmers are encouraged to conserve land by participating in financial incentive programs such as the US Department of Agriculture Conservation Reserve Program (CRP), which pays farmers to retire erodible cropland (USDA Farm Services Agency 2017). Previous research, however, suggests farmers adopt conservation practices for multiple reasons (e.g., normative obligations) other than financial incentives (Prager and Posthumus 2010; Osmond et al. 2015; Meijboom and Stafleu 2016). Nonfinancial motivations for engaging in conservation include taking personal responsibility for the environment (Reimer and Prokopy 2014; Thompson et al. 2015; Floress et al. 2017) or social pressure from others to behave appropriately. The objective of this study was to explore how three normative concepts (i.e., awareness of consequences (AC), ascription of responsibility (AR), and subjective norms (SN)) affect Illinois farmers' intention to continue participation in conservation without compensation.

The Concept of Norms

Norms can refer to what most people are doing (a descriptive norm) or to what people should or ought to do (an injunctive norm) in a given situation (Cialdini et al. 1990). Cialdini and Trost (1998) define norms as "rules and standards that are understood by members of a group, and that guide and/or constrain social behavior without the force

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of laws" (p.152). Different theoretical frameworks within the social sciences, however, define the concept differently (Vaske and Whittaker 2004).

One conceptual tradition, for example, examines the relationships between personal norms that are activated (Schwartz 1977; Vaske et al. 2015; Landon et al. 2017) and the resulting behavior. A second tradition hypothesizes that social norms are an individual's subjective perception of social pressure (Fishbein and Ajzen 1975, 2010). SN (i.e., what you think important others and peers would want you to do) are predicted to influence behavioral intentions and behavior (Schepers and Wetzels 2007; Manning 2009).

These two traditions complement each other (Harland et al. 2007). For example, each paradigm provides information about when a norm exists and is likely to direct behavior or behavioral intentions. Each paradigm, however, does some things better than the other does. For example, personal norm activation models (NAM) may be more appropriate for understanding factors that influence responsible environmental behavior (e.g., not littering, recycling newspapers, and practicing conservation), whereas SN may be better at highlighting the social influence of others on behavior (Vaske and Whittaker 2004), regardless of the context.

Norm Activation Theory

Schwartz' NAM (Schwartz 1968, 1973, 1977) explores the conditions under which personal norms affect behavior. The NAM focuses specifically on altruistic acts caused by beliefs of what is morally correct. Conceived as a personal norm, enforced by an internal sense of obligation to others, Schwartz (1977) suggested that personal norms are activated when two conditions are met. First, individuals need to be aware of the consequences (AC) their behavior has on others. Second, individuals must ascribe responsibility (AR) for their actions to themselves. AC and AR are predicted to influence how situations are evaluated, the extent of norm activation, and whether behavior will change. Stern et al. (1999); Stern (2000) further suggested that individuals ascribe responsibility to the self for environmental conservation. The relative role of social norms (i.e., subjective) on personal norms, however, is not well understood (Landon et al. 2017).

Although the personal NAM was initially used to explain norm-behavior consistency in helping behaviors (Schwartz 1973, 1977), its applicability to environmental behavior is well demonstrated. Scholars have argued that decisions regarding the environment are a moral issue (Heberlein 1972; Thøgersen 1996; Schultz 2011). Past research has offered a variety of applications of the NAM to pro-environmental behavior (PEB). For example, Van Riper and Kyle (2014) found that national park visitors' personal normative beliefs (i.e., AR, AC, and PN) were directly related to their engagement in voluntary behaviors to protect park resources. Landon et al. (2018) documented a positive influence of tourists' personal norms about resource conservation on intentions to support sustainable consumer behaviors. Raymond et al. (2011) found that landowners' personal norms influenced voluntary native vegetation conservation behaviors. Findings from these studies illustrate that both AC and AR were positively related to a range of conservation behaviors and intentions.

Theory of Reasoned Action (TRA)

The theory of reasoned action (TRA) suggests that volitional behavior is influenced by intentions to behave, which are directed by both social norms and attitudes (Fishbein and Ajzen 1975, 2010). Subjective (i.e., social) norms identify what an individual believes other important people and peers think the person should do, whereas the individual's attitudes clarify the person's beliefs and evaluations about an object (e.g., situation, context) (Schepers and Wetzels 2007; Manning 2009). While NAM researchers measure personal norms (i.e., AC and AR), TRA researchers measure perceived social norms (i.e., SN).

Natural resource applications of TRA models have shown that SN predict pro-environmental intentions and behaviors including: (1) support for natural resource management (Bright et al. 1993), (2) intentions to help mitigate wildfires (Bates et al. 2009), (3) intentions to enroll in an incentives program to protect endangered species (Sorice and Conner 2010), and (4) intentions to conserve water (Trumbo and O'Keefe 2007; Landon et al. 2016). This research suggests that individuals' normative beliefs about social network approval are related to evaluations of environmental behaviors.

Research has used both NAM and TRA variables to predict voluntary conservation behavior (Kaiser et al. 2005; Bamberg and Möser 2007; Mastrangelo et al. 2014). Bratt (1999), for instance, blended norm concepts from both Fishbein and Ajzen (1975) and Schwartz (1977) in a study on recycling behavior. The subjective social norm was measured by asking respondents whether they believed that (1) their spouse and (2) their children thought they should recycle paper products. Assumed consequences, a personal norm indicator, were measured with two variables that reflected beliefs about the consequences of not recycling on the environment. Results showed that individuals who experienced the social norm (i.e., believed that others thought they should recycle) and who had accepted the consequences of their actions were more likely to have a pro-recycling personal norm and ultimately recycle.

In Bratt's (1999) work, subjective norm and the assumed consequences variables were both direct predictors of the behavior. Theoretically, however, AC (and AR) could mediate the relationship between SN and reported behaviors. Family, friends, and colleagues, for example, could increase a person's awareness of the consequences of his/her actions and encourage the individual to take responsibility for the behavior. Some have formally argued that perceived social influence precedes personal norms. For example, Fang et al. (2018), in study of farmers' PEB, documented a significant relationship between SN, personal norms and behavioral intentions.

While consensus exists that TRA and NAM concepts alone are insufficient to explain environmental behavior (Kaiser et al. 2005), no single theoretical framework has emerged that integrates these theories. Research (Mastrangelo et al. 2014; Fang et al. 2018), however, has highlighted the effect of SN on the adoption of morally relevant environmentally behavior and suggested that NAM variables (e.g., AC and AR) may mediate the relationship between SN and PEB. A comprehensive meta-analysis of the determinants of conservation behavior supported this causal ordering (Bamberg and Möser 2007). Scholars have also demonstrated that SN can positively influence awareness of environmental concern (Brehm et al. 2006) and prosocial behavior (Van Vugt 1998). Finally, Pradhananga and Davenport (2015) found a relationship between SN and moral obligation for civic engagement among landowners in a Minnesota watershed. These studies suggest that AC and AR may mediate the relationship between SN and conservation behavior and behavioral intentions. Relative to this study, the conservation behavior of interest is Illinois farmers' intention to continue participation in incentive programs such as the CRP without compensation.

Farmer Payment Programs

Private lands conservation programs in the USA are largely funded by the Farm Bill (Stubbs 2014). Between 1995 and 2014 over $42 billion (~13% of all farm subsidies) were spent on conservation payments to farmers to engage in practices such as cropland retirement, stream buffers, and conservation tillage (Environmental Working Group 2017). Payments are assumed to be necessary to motivate farmers to conserve (Tilman et al. 2002). The approach contends that, without payments, landowners will not be motivated to participate in conservation (Ruhl 2007). If enough landowners participate in these programs, negative environmental impacts from farming (e.g., fertilizer pollution) can be reduced and benefits (e.g., improved water quality) to the public increased (Okuman et al. 2018).

Payments assume that the primary barrier to farmer adoption of conservation practices is economic. These barriers, however, are often a complex mix of social, personal, and economic factors, and there is limited evidence that financial factors take precedence for farmers (Prager and Posthumus 2010). Farmers may adopt practices on their own, without payments, for personal or social normative reasons (Osmond et al. 2015; Pradhananga et al. 2017).

Examining the persistence of program adoption apart from payments is important for inducing changes in behaviors affecting farming practices (Mezzatesta et al. 2013; Dayer et al. 2018). Some researchers do not consider financial incentives to be a durable behavior change technique (De Young 1993, 2000). Other researchers believe that external rewards (i.e., payments) subvert intrinsic motivations such as moral obligation (Bowles 2008; Bowles and Polania-Reyes 2012; Pradhananga et al. 2017). Scientists are advising governments to find ways to capitalize on farmers' stewardship ethics to encourage long-term behavior change and reduce the cost of farm payments (Thompson et al. 2015; Ramsdell et al. 2016).

Study Context

Illinois is one of the top agriculture states in the United States, ranking third nationally in terms of prime farmland across 75,087 farms (Illinois Department of Agriculture 2019). Illinois is also one of the 26 US states lying wholly or partially in the Mississippi River watershed. Runoff (i.e., nonpoint source pollution) from fertilizer application across Illinois is estimated to be responsible for 13–15% of nitrogen and phosphorous flowing from the Mississippi River into the Gulf of Mexico (Illinois EPA 2015). These nutrients cause algal blooms and resulting eutrophication leads to seasonal hypoxic ("dead") zones. Such zones have oxygen levels too low to support life and lead to severe environmental and economic impacts (Turner et al. 2007; Rabotyagov et al. 2014). This study examined the following hypotheses.

Hypotheses

Based on existing theory (i.e., NAM and TRA) and previous research, we hypothesized that the subjective (social norm) would be positively related to the two personal norm concepts (AC and AR), and conservation intentions without compensation. We also predicted that AC would be positively related to AR, and that AC and AR would be positively related to conservation intentions. The six positive relationships shown in Fig. 1. We also hypothesized SN

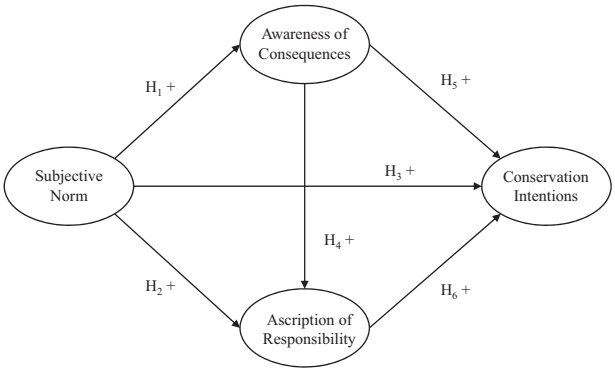

Fig. 1 Hypothesized relationships between norm concepts and conservation intentions

will be indirectly related to behavioral intention through AC and AR (hypothesis 7).

Methods

Survey Sampling International selected a random sample of Illinois farmers' names and addresses. Each potential respondent was mailed a questionnaire, a cover letter, and a stamped return envelope. Approximately 14 days after the initial mailing, nonrespondents were mailed a reminder postcard, followed by a second complete packet 14 days later. A second postcard reminder was mailed 16 days later, followed by a third questionnaire packet. Of the initial 3000 farmers on the mailing list, 2808 surveys were deliverable. Of these, 910 usable surveys were returned (response rate = 32%). Following Linder et al. (2001), early respondents were compared to late responders as a nonresponse bias check. Because these comparisons did not differ statistically on variables in this study, the data were not weighted.

Indicator Variables and Latent Concepts

Subjective norm was measured with five questions. Respondents were asked, how likely is it that the groups of people would expect you to implement conservation practices? The response choices were: (1) my family, (2) my neighbors, (3) environmental organizations, (4) government agencies, and (5) other farmers. Each item was coded on a seven-point scale that was recoded for analysis to extremely unlikely (−3), moderately unlikely (−2), slightly unlikely (−1), neutral (0), slightly likely (1), moderately likely (2), and extremely likely (3).

AC was measured using four items: (1) My farming practices improve water quality in the Gulf of Mexico, (2) My farming practices improve water quality locally, (3) Conservation tillage on my farm would improve water quality, and (4) Stream buffers on my farm would improve water quality. Each question was coded on a seven-point scale that was recoded for analysis to strongly disagree (−3), moderately disagree, (−2), slightly disagree (−1), neutral (0), slightly agree (1), moderately agree (2), and strongly agree (3).

AR was measured with two items: It is my responsibility to help protect water quality (1) in the Gulf of Mexico, and (2) locally. The response scale was the same as that used for AC.

The dependent variable was intention to continue participation in conservation without compensation. The question was worded: If you were not receiving payment for participating in the programs listed above or other similar programs, would you continue to engage in conservation. The programs listed in the survey included (1) CRP, (2) Conservation Reserve Enhancement Program, (3) Agricultural Conservation Easement Program, (4) State Acres for Wildlife Enhancement, (5) Farmable Wetlands Program, (6) Source Water Protection Program, and (7) Conservation Stewardship Program. The response scale was definitely no (−2), probably no (−1), not sure (0), probably yes (1), and definitely yes (2). Only people who were currently being paid to participate in a conservation program were included in the analysis ($n = 551$).

Analyses

The missing data were randomly distributed throughout the variables, with no discernable pattern. Following Vaske (2019), missing values were replaced with the mean of that variable for analysis. The internal consistency of all constructs was examined using Cronbach's alpha. A confirmatory factor analysis examined whether the observed variables provided a good fit to the data[1]. Stata software was used for the analysis (StataCorp 2017). The Satorra–Bentler robust estimation was used to correct for multivariate nonnormality because data skewness and kurtosis indicated violations of the normality assumption (Chou and Bentler 1995). Robust corrected Comparative Fit Index (CFI*), Non-Normed Fit Index (NNFI*), and Root Mean Square Error of Approximation (RMSEA*) assessed model fit (Browne and Cudeck 1993).

[1] Podsakoff et al. (2003) proposed the Harman single factor test as one approach for examining common method bias. This test is based on a principal components exploratory factor analysis (EFA) of all original questionnaire items being examined, without rotation and with the number of factors fixed to one. If this single factor EFA explains < 50% of the variance, method bias is generally not considered to be a problem. Applied to the items in this article, the single factor explained 41% of the variance. This approach, when coupled with the CFA and Cronbach reliability analysis results presented here (e.g., factor loadings, fit indices, reliability coefficients), suggests that common method bias was generally absent.

Construct convergent validity was assessed with composite reliability, average variance explained (AVE), and the squared correlations between constructs (Hair et al. 2010). Convergent validity was considered acceptable if values for (1) composite reliability were greater than or equal to 0.7 (Raykov 1997), (2) the AVE by the latent variable exceeded 0.5 (Netemeyer et al. 2003; Hair et al. 2010), and (3) the standardized factor loadings exceeded 0.4 (Brown 2015).

Construct discriminant validity was assessed by (1) confidence intervals around latent variable correlation estimates, (2) AVEs greater than squared correlation among latent variables, (3) constraining latent factor correlations, and (4) the Variance Inflation Factor (VIF), which examines multicollinearity. Discriminant validity was suggested when the following conditions were met. First, the confidence interval around the correlation between two factors did not include 1.0 (Anderson and Gerbing 1988, p. 416). Intervals that included 1.0 suggest that the measures reflect the same variable. Second, the AVEs for each latent variable were greater than the squared correlations between each of the variables (Fornell and Larcker 1981). Third, the chi-square difference test (Byrne 1998) indicated whether the constraint model (correlations between the latent variables constrained to 1.0) impacted model fit (Bagozzi and Phillips 1982). Finally, a VIF ≥ 4.00 was considered too much multicollineary (Fox 1991; Vaske 2019).

Model fit was assessed against the criteria recommended by Hu and Bentler (1999). A structural equation model (SEM) examined the predictive validity of the model in Fig. 1 (hypotheses 1–6). A relationship was judged statistically significant at $p < 0.05$. Finally, a test of the indirect effects of SN on behavioral intention was conducted. Given that the confidence intervals for indirect effects have been shown to be asymmetrical, a bootstrapping procedure with 1000 replications was used to estimate a 95% confidence interval. The indirect effect was considered significant if the confidence interval did not contain 0.

Results

The sample was 90% male and 10% female; the average age of respondents was 62.1. A little over a quarter (27%) indicated either definitely no or probably no to the question regarding their intention to engage in conservation without pay. Nearly half (48%) said they would continue conservation even if they were not being paid and a quarter (25%) were not sure. The mean for this variable was 0.25, the median was 0 and the mode was 1. The standard deviation was 1.21.

On average, respondents slightly believed that their family ($M = 0.57$, $SD = 1.92$), neighbors ($M = 0.36$, $SD = 1.75$), environmental organizers ($M = 0.84$, $SD = 2.01$), government agencies ($M = 0.75$, $SD = 1.96$), and other farmers ($M = 0.38$, $SD = 1.84$) would expect them to implement conservation (Table 1) as all means were above

Table 1 Standard deviations, means, alpha if item deleted, cronbach's alpha and standardized factor loadings for the normative constructs

	SD	*M*	Alpha if item deleted	Cronbach's Alpha	Standardized factor loading
Subjective norms How likely is it that the groups of people listed below would expect you to implement conservation practices such as conservation tillage and stream buffers?[a]				0.97	
My family	1.92	0.57	0.96		0.92
My neighbors	1.75	0.36	0.96		0.95
Environmental organizers	2.01	0.84	0.96		0.92
Government agencies	1.96	0.75	0.96		0.90
Other farmers	1.84	0.38	0.96		0.95
Awareness of consequences[b]				0.97	
My farming practices improve water quality in the Gulf of Mexico	2.09	0.38	0.96		0.95
My farming practices improve water quality locally	2.16	0.65	0.95		0.97
Conservation tillage on my farm would improve water quality	2.09	0.43	0.95		0.94
Stream buffers on my farm would improve water quality	2.01	0.34	0.96		0.89
Ascription of responsibility[b]				0.96	
It is my responsibility to help protect water quality in the Gulf of Mexico	1.78	0.63	–		0.96
It is my responsibility to help protect water quality locally	1.85	0.72	–		0.97

[a]Measured on a 7-point scale that was recoded for analysis to Extremely Unlikely (−3) to Extremely Likely (+3) with 0 as the midpoint

[b]Measured on a 7-point scale that was recoded for analysis to Strongly Disagree (−3) to Strongly Agree (3) with 0 as the midpoint

Table 2 Tests of construct validity

	Squared correlations between constructs				
	Subjective norms	Ascription of responsibility	Awareness of consequences	Average variance explained	Composite reliability
SN	1.00			0.87	0.96
AR	0.79	1.00		0.93	0.96
AC	0.43	0.48	1.00	0.88	0.97

SN subjective norms, *AR* ascription of responsibility, *AC* awareness of consequences

0 (the neutral response). The Cronbach's alpha coefficient for these five subjective norm items was 0.97. Deleting any of the variables did not improve the overall alpha.

Four items were used to measure the AC concept. Means ranged from 0.34 to 0.65 (i.e., neutral to slightly agree), the standard deviations ranged from 2.01 to 2.09, and the overall Cronbach's alpha was 0.97 (Table 1). As might be expected, Illinois farmers were more likely to take responsibility for protecting water quality locally ($M = 0.72$, $SD = 1.77$) as compared to water quality in the Gulf of Mexico ($M = 0.63$, $SD = 1.85$). Although this difference was significant (paired $t = 2.98$, $p = 0.003$), both means were positive and suggest that farmers do want to take responsibility for their actions. The Cronbach's alpha coefficient for this two-item index was 0.96.

Tests for convergent and discriminant validity (Table 2) revealed adequate psychometric properties for all scales (composite reliability > 0.7; AVE > 0.5, and squared correlations between constructs less than the AVE). Colinearity among the constructs did not appear to be a problem as all VIFs were <4.0.

These data provided an acceptable fit for the SN, AC, and AR constructs. The CFA standardized factor loadings ranged from 0.90 to 0.95 for SN, 0.89 to 0.97 for AC, and 0.96 to 0.97 for AR.

A series of fit indices were estimated for the SEM in Fig. 1. Based on the Satorra–Bentler robust estimation for multivariate non-normality, the model produced a significant chi-square ($\chi^2 = 118.33$, $df = 40$, $p < 0.001$); however, large sample sizes inflate this statistic. Marsh and Hocevar (1985) suggest that the chi-square statistic should be evaluated in relation to the model's degrees of freedom; a χ^2/df ratio of 2:1 to 5:1 indicates an acceptable fit. The ratio was in this range ($\chi^2/df = 118.33/40 = 2.95$). Other fit indices that were examined included the robust corrected Comparative Fit Index (an acceptable CFI* value > 0.95), Non-Normed Fit Index (an acceptable NNFI* > 0.95) and the Root Mean Square Error of Approximation (an acceptable RMSEA* value 0.05–0.08). The CFI*, NNFI*, and RMSEA* were in acceptable ranges (0.988, 0.983, and 0.076, respectively).

SEM were used to examine the predicted relationships (Fig. 2). SN were predicted to positively influence AC and AR. The concept had significant effects and in the predicted direction in both models (i.e., $\beta = 0.65$, $p < 0.001$ for AC, $\beta = 0.76$, $p < 0.001$ for AR). AC was hypothesized to positively predict AR. The data supported this relationship ($\beta = 0.20$, $p < 0.001$). SN accounted for 43% of the variance in AC, and SN and AC accounted for 81% of the variance in AR; these findings support hypotheses 1, 2 and 4.

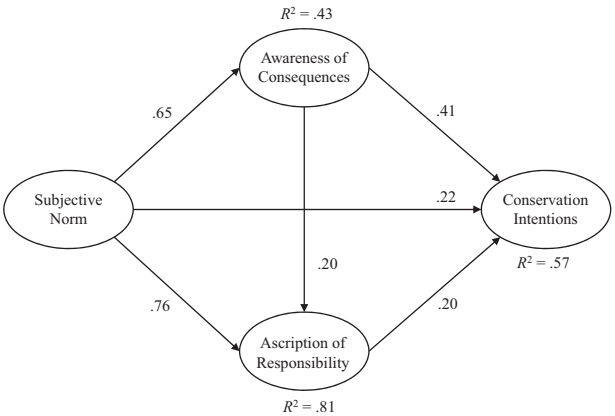

Fig. 2 Observed relationships between norm concepts and conservation intentions. Path coefficients are standardized regression coefficients. All coefficients significant at $p < 0.001$

The final SEM model treated SN, AC, and AR as predictors of farmers' intentions to continue to participate in conservation without compensation. Because the dependent variable was a single item indicator, the error variance had to be estimated. A series of estimates were considered (e.g., 0.10, 0.15, and 0.20). Because all estimated error variances produced similar results, the variance was set to 0.10. All three independent variables were statistically significant and in the predicted direction (Fig. 2). The standardized regression coefficient for AC was 0.41 ($p < 0.001$). The coefficients for AR and SN were similar ($\beta = 0.20$ and $\beta = 0.22$, respectively) and were significant at $p < 0.001$. The three norms variables (SN, AC, and AR) accounted for 57% of the variance in the intention to continue participation in conservation. These findings support hypotheses 4–6. Results revealed a significant indirect effect of SN on behavioral intention partially mediated by AC and AR

($b = 0.30$, $p < 0.001$; 95% Lower = 0.21, 95% Upper = 0.39)[2]. This finding lends support to hypothesis 7.

Discussion

This study hypothesized that SN would be positively related to AC (hypothesis 1), AR (hypothesis 2), and conservation intentions without pay (hypothesis 3). AC was predicted to be a direct antecedent to AR (hypothesis 4). It was also hypothesized that AC (hypothesis 5) and AR (hypothesis 6) would be positively related to conservation intentions without compensation. Finally, it was hypothesized SN exerted an indirect effect on intention to practice conservation without compensation through AC and AR (hypothesis 7). All seven hypotheses were empirically supported. The final SEM explained 57% of the variance in voluntary conservation intentions. These findings have theoretical and applied implications.

Theoretical Implications

The primary dependent variable in this study was behavioral intentions to practice conservation without payment. Approximately 50% of the respondents said yes they would continue conservation even if they were not being paid. Since all respondents were currently being paid to participate, this had to be a hypothetical question. If possible, future research should include individuals who were formerly in programs such as CRP and have since dropped out. Did these individuals continue conservation practices?

Hypothetical questions also raise questions about social desirability bias, which refers to respondents providing answers consistent with societal norms or the perceived viewpoint of the researcher (Dillman et al. 2014). The same problems occur for SN, AC, and AR. Respondents could over-inflate their responses to these types of questions (Schwartz 1977; Fishbein and Ajzen 2010). The problem is not unique to the social sciences. Economists grapple with the same issues whenever they ask hypothetical willingness to pay questions (Bobinac 2019). Although solutions to social desirability bias are not always available, repeated studies using different types of surveys (e.g., mail, phone, and internet) may help to shed some light on the issue (Kim et al. 2019). For example, the pattern of findings should be the same across studies (Cernat 2015).

A recent meta-analysis of 100 articles examined links between SN, personal norms and intentions to engage in conservation behavior (Niemiec et al. 2020). Personal norms were more strongly related to intentions and were more often significantly associated with intentions compared to SN. Adding personal norms to behavioral intention models significantly reduced the effect of SN on intentions. In the study here, the beta coefficient for AC was twice as large as the beta for SN, but the relationships for SN on intentions and AR on intentions were about equal. AC and AR also mediated the relationships between SN and conservation intentions.

The coefficients from SN to AC ($\beta = 0.65$) and from SN to AR ($\beta = 0.76$) were somewhat similar, but SN explained twice as much variance in AR ($R^2 = 0.81$) as compared to AC ($R^2 = 0.43$). It may be that important others influence whether individuals take responsibility for their actions, but have less impact on their AC of their behavior. The topic should be explored directly in future research.

The NAM examines AC and AR. However, the model also includes: (1) outcome efficacy (the individual's identification of effective solutions and perception of outcomes related to behavioral decisions) and (2) the individual's ability to engage in the PEB (Landon et al. 2017). Although these predictors were not included in this study, they should be addressed in future research. It is possible, for instance, that financial constraints prevent the continuation of conservation practices despite perceived social pressure to do so.

Applied Implications

Using conservation payments alone to solve environmental problems stemming from agriculture is likely to be costly and difficult to sustain. For example, to reduce nitrogen and phosphorus inputs into Illinois streams from farming to successfully combat hypoxia in the Gulf of Mexico is estimated to cost $800 M USD annually (Illinois 2014). This estimate exceeds the total Farm Bill conservation spending in the state of Illinois from 2009 to 2014, and is three times larger than the total annual budget of the Illinois Department of Natural Resources (Illinois 2014). By understanding stakeholder normative beliefs, policymakers can implement least-cost alternatives to reducing nutrient flows (Rabotyagov et al. 2010).

Nationwide, enrollment in CRP has declined by 4.5 M ha since 2007 (USDA 2014), due to high commodity prices, low rental rates, and declining interest in retiring land from production (Stubbs 2014). Fiscal constraints have led Congress to reduce the overall allowable acreage cap from 11.1 M ha in 2014 to 9.7 M ha by 2018 (Stubbs 2014). Given federal and state budget constraints, declining CRP enrollment, and competing needs for conservation, funding for reducing Gulf hypoxia will be challenging. If farmers

[2] The indirect effect estimate is unstandardized and was estimated using the maximum likelihood method. The Satorra–Bentler scaled chi-squared, and bootstrapping procedure are not compatible as both are means of obtaining adjusted standard error estimates.

discontinue conservation practices, the fiscal challenge becomes even greater.

Critics of payments argue that regulations should be used to control nonpoint pollution sources (Nolan 2017). Stream buffer regulations would set appropriate expectations for farmers (Rundquist and Cox 2015). Regulations have a potential role in addressing the Gulf hypoxia problem as they can be potentially efficient, effective, and address large landscape scale problems (Echeverria 2005). Regulations, however, are frequently unpopular (Steil 2017), difficult to enact, and their costs (e.g., monitoring, enforcement) can outweigh the benefits (Stern 2000; Kling 2001; Shortle and Horan 2001). Lack of success with incentives and regulations suggests a need for other approaches. The language of the Clean Water Act (USC 33 1251 1972) that positions nonpoint source pollution control as a voluntary act further highlights this need. As demonstrated here, encouraging a sense of social responsibility in farmers is a potential way to improve the efficiency and effectiveness of limited conservation dollars and increases the long-term durability of practice adoption.

Leveraging social influence to activate internalized responsibilities and known consequences of failures to control nonpoint source pollution might encourage farmers to adopt beneficial practices. Farmers might respond positively to messages that make them aware of the consequences of their actions and appeal to a sense of social responsibility (Prokopy et al. 2008; Thompson et al. 2015). Messages of financial benefits (i.e., adopt a practice because of the payment) may undermine the ability to encourage farmers to take responsibility for their actions (Babcock 2009). Research should empirically examine when private landowners should be paid versus farmers taking responsibility on their own (Freyfogle 2007). This would help to ensure that conservation programs have a net positive benefit (Mezzatesta et al. 2013).

Research is also needed on nonfinancial barriers (e.g., time, convenience, labor, and knowledge) to farmland conservation before enacting payments. Payment programs typically do not distinguish between landowners who are positive, negative, or indifferent toward conservation. Removing nonfinancial barriers might involve providing specialized equipment, the knowledge obtained through social networks, using farmer ambassadors, and combined production and conservation planning (Prokopy et al. 2014). These changes may be facilitated by understanding the roles social norms, coupled with AC and responsibility, play in fostering conservation behaviors outside of the payment structure over time (Prokopy et al. 2014; Dayer et al. 2018). Although this study demonstrated a positive role for SN, AC, and AR in voluntary conservation intentions, the model accounted for slightly more than 50% of the variance. The remaining unexplained variance might be accounted for by individuals who hold positive views of conservation but lack the financial means, technological know-how, or social capital to act on feelings of responsibility.

Conclusions

Overall, the normative concepts examined in this study have facilitated the design of persuasion campaigns intended to modify behavior (e.g., "leave no trace" efforts). For anti-litter campaigns, Grasmick et al. (1991) suggested appealing to individuals' personal norms of guilt or informal sanctions of embarrassment. Many low impact behaviors involve the diffusion of innovative practices that were initially adopted by experienced leaders (e.g., human waste disposal systems). TRA offers an explanation of how these innovations are diffused in a larger population through the influence of others (i.e., SN). Although personal norms account for individuals' adoption of voluntary conservation behaviors, the mechanism that lead to the development of personal norms are not well demonstrated. As illustrated here, SN may facilitate our understanding of these relationships and help to achieve conservation targets (e.g., Goldstein et al. 2007, 2008; Landon et al. 2018).

Research shows that money undermines norms in a variety of settings and circumstances (Bowles 2008). For example, payment might distract from teaching a land ethic. Leopold (1949) clearly believed land ownership was a moral issue and concluded that we must quit thinking about land use as a solely economic problem and instead "examine what is ethically and esthetically right, as well as what is economically expedient" (p. 224). In socio-psychological terms, Leopold was expressing the belief that conservationists should emphasize moral norms rather than just extrinsic rewards (i.e., financial incentives). Findings here suggest that farmers are willing to do the "right" thing without payment, and that perceived social influence may underpin the development of moral normative beliefs that compel actions that benefit the environment. In the context of the specific issue in which this model was applied and given reduced participation in CRP and related programs, understanding and working with these normative beliefs will enable planners, managers, and policymakers to decrease nutrient flows that severely impact the Gulf of Mexico and other conservation issues.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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