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Farmers' Social Capital in Agricultural Decision-Making☆

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ABSTRACT Reducing tillage is a key goal for conservation and regenerative agriculture, yet research has struggled to identify ways to increase the use of the practice among farmers. Recent scholarship has identified social capital as an important piece of the adoption puzzle. However, the ways in which farmers' social capital influences conservation practice use are seldom identified or explored. In this study, we tested the effects of three measures of social capital on the adoption of no-till among 1,523 row crop farmers in the United States Corn Belt. Specifically, we operationalized the extent to which farmers' social networks, network trust, and community conservation norms affect intra-individual processes and thus influence farmers' decisions regarding adoption. Our results identified key mechanisms for the promotion of conservation practices through social capital. Subjective conservation norms emerged as a main pathway through which farmers' social capital influenced their use of no-till, indicating that networks, network trust, and community norms can increase adoption through affective paths. We conclude that academic research and policy experts should continue to situate farmers as social actors and pay heed to the norms and cultural expectations surrounding agricultural conservation practices.

Introduction

In the US Corn Belt, problems such as soil erosion, non-point source water pollution, and declining soil health have plagued agriculture for decades (Hellerstein, Vilorio, and Ribaudo 2019; Thaler, Larsen, and Yu 2021). In response, researchers, consultants, and government agencies have encouraged the development of conservation practices that align with farmers' production goals while also improving soil retention and health. No-till is one such practice, but it has yet to achieve widespread implementation (Claassen et al. 2018). Despite its frequent promotion, implementation has remained uneven, in part because land management practices vary widely (Miao et al. 2018).

Given these challenges, scholarship on conservation practice adoption has focused on identifying the attributes of farmers who *do* adopt practices. Economic aspects of farmers' decision-making have been studied extensively (Burton 2004; Ranjan

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et al. 2019), while psychologists and sociologists have applied social-psychological theories that incorporate variables such as attitudes, knowledge, and perceived benefits of adoption (Delaroche 2020). These approaches have only been partially successful at reconstructing farmers' decision-making for adoption; a common critique is that both focus on cognitive factors internal to the farmer at the expense of factors that represent farmers' social and political realities (Engler, Poortvliet, and Klerkx 2019; Ranjan et al. 2019; Reimer et al. 2014; Yoder et al. 2019). More recently, there has been a push to situate farmers as socially connected actors rather than isolated individuals (Chaudhuri et al. 2021; Gareau et al. 2020; Reganold et al. 2011; Ren, Fu, and Zhong 2022; Yoder et al. 2019), albeit with limited demonstrations of operationalization.

Viewing farmers as socially connected actors is compatible with the concept of social capital. Social capital remains a deliberately broad concept, but one definition likens it to the elements within a social structure that can bring about beneficial results for individual actors (Coleman 1990). Although there has been a clear uptick in variables that account for social and political contexts within interdisciplinary studies of conservation practice adoption, the mechanisms by which social capital influences farmers' practice adoption are seldom identified or explored (Miao et al. 2018).

In this study, we tested the effects of three measures of social capital on the adoption of no-till among row crop farmers in the US Corn Belt. Specifically, we examined the extent to which farmers' social networks, network trust, and community conservation norms may or may not work through cognitive processes to influence farmers' decisions regarding adoption. Our analysis is novel in that it empirically tests whether social capital works independently to influence practice adoption or acts through cognitive variables. Our results identify key mechanisms for the promotion of conservation practices like no-till through social capital and indicate that the potential of social capital has yet to be fully unlocked in the study and implementation of agricultural conservation.

Background

Since the 1930s, agricultural researchers and government agencies have sought to promote conservation practices in ways that align with farmers' existing management practices (Secchi 2024). Early scholarship focused on identifying economic barriers that farmers faced when considering conservation practice adoption, a common assumption being that economic incentives would drive more farmers to adopt. However, programs like the US Department of Agriculture's Environmental Quality Incentives Program, which provides technical and financial assistance to help farmers integrate conservation practices, have proved only partially successful (Bailey and Merrigan 2010). In response, scholars began examining social-psychological attributes of farmers' decision-making, such as environmental attitudes and perceived benefits, to explain why farmers chose conservation practices or continued to reject them (Mills et al. 2017).

To date, a plethora of research has sought to identify factors influencing farmers' decisions to use conservation tillage types including no-till. Common categories of variables used to predict adoption include socio-demographic variables such as age and experience, farm structure variables like size and business structure, practice characteristics including relative advantage and compatibility, and socio-psychological variables like attitudes and risk tolerance (Ogieriakhi and Woodward 2022; Prokopy et al. 2019; Ranjan et al. 2019; Wauters and Mathijs 2014). From this work, evidence emerged of farmers adopting practices in a manner that was counterintuitive to earlier assumptions of farmers as strictly rational actors (Carlisle 2016). At the same time, while the addition of these variables provided a more complete picture of the choices farmers had to contend with over and above business decisions, meta-analyses have largely found a lack of consistent influences on farmer conservation behavior, including tillage decisions (Knowler and Bradshaw 2007; Ogieriakhi and Woodward 2022; Prokopy et al. 2019; Ranjan et al. 2019; Wauters and Mathijs 2014).

Social-psychological frameworks like the Theory of Planned Behavior (TPB) (Ajzen 1991), the Reasoned Action Approach (RAA) (Epanchin-Niell et al. 2022), diffusion of innovations (Rogers 1995), and the values-beliefs-norm (VBN) model (Stern 2000) have been implemented across multiple disciplines to examine the contexts that influence farmers' decision-making. Across these frameworks, a major mechanism of interest has been the link between farmers' management behaviors and their underlying attitudes and beliefs (Ajzen 1991; Beedell and Rehman 2000). TPB and VBN have been especially important for understanding voluntary practice adoption, as opposed to incentivized or government-mandated practices (Mills et al. 2017). Among the most frequently operationalized social-psychological concepts are farmers' attitudes, perceptions, beliefs, and intentions, which have been linked to pro-environmental behavior (Delaroche 2020; Stern 2000). Scholars have since extended the presence of pro-environmental behavior to predict farmers' willingness to adopt conservation practices (Coulibaly et al. 2021; Mills et al. 2017; Prokopy et al. 2019; Ranjan et al. 2019).

While findings from these studies are robust, their primary focus has been on psychological factors that situate conservation practice adoption as a hypothetical action. Among these studies, insights from social theory have been scant (Engler et al. 2019; Reimer et al. 2014; Yoder et al. 2019). Several exceptions have examined the linkages between social capital and tillage behavior. For example, Skaalsveen, Ingram, and Urquhart (2020), through social network analysis of no-till farmers, found that they formed networks with like-minded individuals despite geographic distance, and that connections to other no-till farmers as sources of information and assistance were influential on individuals' decisions to adopt. On the contrary, a recent study of Michigan farmers found that social network connectivity *negatively* impacted conservation tillage adoption, perhaps due to increased social risk associated with trying new practices (DeDecker et al. 2022). A systematic review of the literature on conservation tillage identified social pressure as both a potential motivator and barrier of practice adoption, emphasizing that social factors present an avenue for future work to examine in greater detail (Ogieriakhi and Woodward 2022). Likewise, Epanchin-Niell et al. (2022:5) discussed several possibilities for operationalizing social contexts relevant to conservation practice adoption, including "characteristics of communities, patterns of social stratification, culture, and the normative context relative to the use of conservation." While these works reflect a growing trend of explicitly linking social theory to farmer behavior, measuring the influence of contextual factors remains a challenge. In this regard, the concept of social capital, which bridges individual attributes with social conditions whose effects do not exclusively depend on farmers' internal cognitive processes, represents a promising direction.

Social Capital and Collective Behavior in Conservation

As a concept, social capital is broadly interpreted. While Putnam's (1995) definition of social capital focused on forms of civic engagement fostered by connections between individuals in formal and informal settings, Coleman (1990) likened social capital to a type of social function. Specifically, any form of social structure that can engender a desired outcome for those within the structure counts as social capital. Such elements can include norms, networks, and trust, which align with other interpretations of social capital (Burton, Kuczera, and Schwarz 2008; Burton and Paragahawewa 2011; Ghorbani et al. 2022; Mayer et al. 2022; Portes 1998; Rust et al. 2020; Sutherland and Burton 2011).

For some, social capital is critical for collective behavior (Miao et al. 2018). Collective behavior has obvious salience in the high-stakes world of natural resource management, the caveat being that the field's use of social capital rarely suggests full consensus among actors. Rather, scholarship has constructed social capital as loose networks of relevant stakeholders who influence each other's knowledge, values, and scope of actions that can accumulate into a form of normative behavior (Moody and Paxton 2009). Woolcock and Narayan (2000) have called this version of social capital "the norms and networks that enable people to act collectively" (Woolcock and Narayan 2000:226), although enabling collective behavior does not guarantee that it will happen.

Collective behavior is likewise relevant to farmers' land management, but scholars have only just started to operationalize farmer behavior with intentional collectivity in mind (Miao et al. 2018; Ogieriakhi and Woodward 2022; Skaalsveen et al. 2020). Instead, the dominant approach has been to track the actions of individual farmers, then consolidate similar behavior within a specific region. With this method, while collective behavior is technically occurring, forms of social capital exchanged by farmers have not been accounted for. One exception is Lavoie and Wardropper (2021), who found that farmers who implement no-till often share the farming equipment necessary to direct seed without tilling. Their findings support the idea that resource-sharing enables more farmers to implement no-till, which represents a form of intentional collective behavior. In other words, farmers exchange social capital and simultaneously normalize a conservation practice, albeit in a way that benefits their individual operations.

In short, there is still room to clarify how social capital enables individual farmers' land management decisions due to shared management goals and the evolution of new or established relationships with other stakeholders. We employ the concept of "mechanisms" (Hedström and Ylikoski 2010) to describe potential links between collective and individual management decisions.

Social Capital Exchange as Mechanisms of Farmer Decision-Making

Several practice adoption studies have constructed social capital as interpersonal connections that can influence individual behavior through the provision of information (Coleman 1990; Kolady et al. 2021; Rust et al. 2020), since farming is an information-intensive industry and newer management practices like no-till require considerable amounts of information to implement (Ingram 2010). This means that a farmer's knowledge is a result of their connections with other relevant actors, such as peer groups and government agencies, who provide both information and advice (Blackstock et al. 2010; Sharp and Smith 2003). The assumption that farmers must be persuaded that a practice will be beneficial before learning how to implement that practice (Arbuckle and Roesch-McNally 2017) is prevalent within practice adoption studies.

However, not all information sources are perceived equally by farmers, and variation in connections presents an opportunity to examine the role of social capital. Finding that farmers develop clear preferences for some information sources over others, Rust et al. (2020) argue that such preferences are a result of farmers and sources exchanging social capital while simultaneously calibrating specific practices to local economies and cultures. Within these negotiations, trust is a crucial ingredient for transforming information into action, but the application of trust in practice adoption studies has been scant. While farmers' connections remain an important form of social capital, we argue that the information exchanged via these connections is also predicated on trust or "cognitive social capital" (Mayer et al. 2022:400). Indeed, reciprocated trust between farmers and information sources may be key to practice adoption, but it has not been thoroughly examined.

Other studies have identified farmers' social standing among peers as an important motivator of farmer behavior, with higher social standing corresponding to greater influence and leverage within one's community (Burton 2004; Ingram 2010). These studies also detail an important method that farmers follow to achieve social standing. Since agricultural practices are often visible to farmers' peers, they represent a public display of farmers' knowledge and values. Farmers often observe and opine on their peers' soil management practices and resulting impacts like erosion levels (Burton 2004; Roesch-McNally, Arbuckle, and Tyndall 2017). Successful use of a practice like no-till may demonstrate a farmer's competency and membership in a growing network of no-till adopters. Conversely, no-till adoption could also carry negative social implications, either if the farmer struggles with managing their operation after shifting to no-till if no-till is seen by the community as an unconventional practice, or if it is perceived that the farmer is acting in accordance with socially unacceptable beliefs about the environment and climate change. This may be especially true if no-till hurts a farmer's yields, as productivism is tantamount to the symbolic, moralized identity of what it means to be a farmer (Burton 2004).

At the same time, a farmer still relies on interpersonal connections with peers, input suppliers, and public agents to acquire the resources necessary to implement new practices (Chaudhuri et al. 2021; Ingram 2010). Depending on how they are judged, farmers may be given or denied further institutional, community, or neighborly support (Ingram 2010; Peterson-Rockney 2022). Farmers engaging in no-till can symbolically reinforce a shared identity within conservationist networks or may fail to demonstrate "good farming" to peers who prioritize productivism (Ingram 2010; Lavoie and Wardropper 2021; McGuire et al. 2015). In these scenarios, farmers are incentivized, enabled, or dissuaded from adopting conservation practices due to forms of social capital centered on peer and professional networks. In general, peer effects as social capital have been sporadically examined in the literature on agricultural decision-making, resulting in mixed conclusions regarding both the significance and direction of effects on adoption (Coulibaly et al. 2021; Gao and Arbuckle 2022; Kolady et al. 2021; Ogieriakhi and Woodward 2022). More clarification is needed regarding why recognition and social standing are also forms of social capital that matter for farmers' conservation decisions (de Krom 2017).

From these studies, it is clear that social capital has a role in conservation practice adoption, but exactly how it influences a farmer's decision to adopt remains ambiguous–in other words, the mechanisms through which social capital influences practice adoption are rarely defined or tested. Qualitative studies of farmers' decision-making have shown that social capital is influential, but it remains unclear which components of social capital matter and what their functions are within farmers' cognitive processes (Rust et al. 2020; Skaalsveen et al. 2020). Quantitative studies often place measures of social capital alongside other psychological, economic, and demographic measures, which prevents the construction of mechanisms between social capital and individual adoption behaviors that offer a more holistic representation of farmer decision-making (Walpole and Wilson 2022).

Illuminating social capital in farmers' decision-making processes, especially decisions regarding conservation practice adoption, thus meets multiple needs. First, it helps clarify whether farmers are acting collectively due to happenstance or unifying deliberately due to shared management goals. Second, it forces consideration of more expansive forms of social capital, such as sharing equipment, social standing, and community cachet. Third, integrating social capital with cognitive measures like attitudes and perceptions constitutes evidence of social forces compatible with farmers' internal logics. Here, we operationalize three forms of social capital that speak to the social contexts influencing individuals: social networks, network trust, and community conservation norms. Specifically, we conceive of these forms of social capital as potential influences on farmers' cognitive processes.

Research Questions

We use social networks, network trust, and community conservation norms to predict farmers' use of no-till. Importantly, we propose that these measures of inter-individual social capital impact farmers' decisions both directly and indirectly through intra-individual cognitive variables that represent a farmer's internal logics

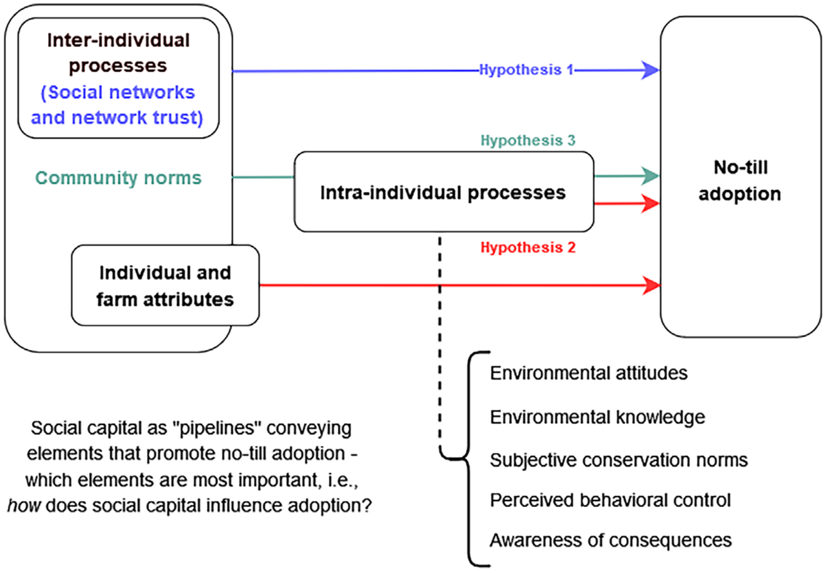

Figure 1. Conceptual Model Showing Measures of Social Capital, Intra-Individual Variables, and Their Relationship with No-Till Adoption.

and thought processes, including general attitudes, perceptions, and beliefs relevant to agriculture. In line with Hedström and Ylikoski's (2010) interpretation, our study formulates social capital as a mechanism that connects elements of social context and structure to corresponding actants, in this case, farmers' decision-making processes. With these goals in mind, we ask: how do cognitive variables intervene in the effects of social capital on farmers' use of no-till?

Figure 1 presents our conceptual model showing measures of social capital, intra-individual variables, and their relationship with no-till adoption. The importance of community conservation norms, illustrated by the leftmost box, provides an impetus for both intra-individual processes and subjective conservation norms to align with a practice like no-till. In a community with high social capital (i.e., strong community), information flows regularly across and between individual farmers and groups. This means that an individual farmer is more likely to seek out and make connections with multiple sources of information, as well as express trust in their information about agronomic practices and land stewardship (inter-individual processes). Following this, a farmer may be more likely to adopt a practice like no-till when they are surrounded by norms reinforcing its adoption. In a community with low social capital (i.e., weak community), intergroup connections are sparser, information exchange is more limited, and less trust is expressed for sources regarding information provision about agronomic practice and land stewardship. In a weak community, the adoption of no-till is more likely due to individual attributes prompting behavior change. The lower portion of the figure shows a direct link between individual attributes and no-till adoption. Here, individuals are still embedded in communities, yet internal cognitive processes drive adoption.

Three hypotheses guided our analysis. First, we hypothesized that social capital would have a direct influence on the use of no-till. We expected that higher levels of integration in farming networks and greater trust in social connections would promote the adoption of no-till (Hypothesis 1). Second, we hypothesized that intra-individual variables would be associated with no-till use as previously demonstrated in established cognitive models such as TPB, RAA, and VBN (Hypothesis 2). Finally, we hypothesized that social capital measures would act through some or all of the cognitive variables to influence farmers' adoption of no-till (Hypothesis 3). For example, belonging to a community with no-till farms should foster subjective conservation norms, which would then affect a farmer's adoption of no-till. If social capital measures influenced intra-individual cognitive variables which in turn influenced practice use, we would interpret this as evidence of a mechanism in which social capital worked through other variables in the model to affect adoption of no-till.

Materials and Methods

Data for this study comes from a 2020 survey of row crop agricultural producers in the US Corn Belt, a geographic region that produces more than one-third of the world's field corn (National Agricultural Statistics Service [NASS] 2019). Our sampling frame included farmers growing corn or soy and operating at least 100 acres in counties with at least 15% of total land area in agricultural production in four states: Illinois, Indiana, Michigan, and Ohio. From this frame, we drew a representative sample stratified by farm size, oversampling farms with more than 500 acres.

Survey distribution followed a modified Tailored Design Method (Dillman, Smyth, and Christian 2014) utilizing a multi-wave postcard-survey format. Farmers in our sampling frame were mailed a self-administered, paper survey questionnaire between January and April 2020 with a prepaid return envelope, followed by a reminder postcard approximately 7 to 10 days later, up to three times over the 10-week data collection period. Our response rate was 42%, which is like other recent mail surveys (Arbuckle Jr. et al. 2013; Beethem et al. 2023; Denny, Marquart-Pyatt, and Houser 2019). The survey instrument contained numerous questions, including about farmers' information source use; their attitudes, beliefs, and knowledge about local and regional environmental issues; management practices used on-farm; the rationale behind their management decisions; and demographics.

Outcome Variable: Using No-Till

Our outcome variable, "no-till," was measured as a management practice that a farmer may have implemented during the 2019 growing season. Farmers were asked the question, "For the following practices, please indicate whether you have used… this practice." Regarding no-till, farmers could indicate "never used, don't want to," "never used, but might," "used to, but no longer do," "yes, sometimes do this," or "yes, regularly do this." We collapsed the first three categories into one to capture farmers' current tillage practices, rather than their past or potential future behavior, ensuring the temporal coherence of our conceptual model. We kept the two categories measuring some use, and regular use.

Measuring Social Capital: Network Connections, Network Trust, and Community Norms

We constructed three measures of social capital that we hypothesized were related to farmers' adoption of no-till as a management practice. Network connections capture the number of connections a farmer has in their professional social network. Network trust is a measure of a farmer's integration with their network measured via their reported trust in their social connections. Normative no-till use is how prevalent no-till is in each farmer's regional community, thus acting as a measure of community conservation norms.

To capture network connections, we focused on the question in which farmers were asked, "When seeking information about new agronomic practices and land stewardship issues, how frequently do you consult your information sources?" Farmers indicated how often they contacted county or regional extension educators, chemical dealers, seed dealers, independent crop consultants, Soil and Water Conservation Districts, USDA agencies, and other farmers. Farmers selected from "once a year," "every few months," "once a month," "once a week or more," or "never." Each measure was recoded to a binary of whether respondents had contact with the source (0 if the farmer reported "never," 1 otherwise). The seven binaries were combined to create a single measure capturing the extent of a farmer's connections, ranging from 0 to 7, portraying an overall level of connectedness for each farmer.

For network trust, we used a question in which farmers were asked how much they trusted each information source. Farmers selected between "not at all," "not much," "some," "quite a lot," and "a great deal." Their answers were coded from 0 to 5 respectively, and averaged across the seven sources, resulting in a measure of general trust ranging from 0 to 5. This average rating indicates a farmer's investment in their networks above and beyond their trust in any single source. Higher values reflected greater overall trust, indicating greater social connections in the form of trust in information sources.

To measure the extent to which adopting no-till is a local social norm, we examined the number of farmers participating in no-till within each county represented in our sample. This measure is closely related to descriptive norms and is designed to reflect the prevalence of no-till in a farmer's geographic location. We used data from NASS's 2017 Agricultural Census to calculate the percentage of farmers using no-till within each county. The lowest county percentage of farms using no-till was around 14%, and the highest was over 78%. This range reflected the high variability of tillage practice use due to local climate, crop planted, rotational practice use, and other factors (Claassen et al. 2018).

Measuring Intra-Individual Variables

To investigate the ways that social capital could potentially reinforce or amplify individual beliefs, we included five intra-individual variables in our model with scholarly precedent: environmental knowledge, environmental attitudes, subjective conservation norms, perceived behavioral control, and awareness of consequences. Our models included three latent constructs proposed to affect no-till adoption: subjective conservation norms, perceived behavioral control, and awareness of consequences. A latent construct is an unobserved variable underlying the relationship between the multiple observed variables used to measure it (Bollen 1989). We tested each latent variable independently using confirmatory factor analysis (CFA) or measurement models, a technique in structural equation modeling with latent variables (SEM). CFA results provide fit statistics[1] for each measure included in the latent variable and the overall fit or quality of the latent construct, both of which need to be examined to assess the fit of the latent constructs and evaluate their appropriateness for the analysis. We provide information on these fit measures in Table A1.

In the survey instrument, farmers were asked how important a variety of actions were to their definition of a "good farmer," with prompts reflecting a variety of productivity or conservation-oriented actions. We focused on conservationist norms because they run counter to the dominant productivism identity, which Burton (2004:197) described as "incorporated with the very ethos of being a 'good farmer'." For our measure of subjective conservation norms, we selected several "good farmer" prompts, including "thinking beyond their own farm," "thinking about the social and ecological health of their watershed," "putting the long-term conservation of farm resources before short-term profits," "minimizing nutrient runoff into waterways," "minimizing soil erosion," and "considering the health of streams that run through or along their land to be their responsibility." Farmers were asked to rank each prompt from "not important" to "very important." Theoretically specified correlated measurement errors were included. CFA fit statistics in Table A1 indicated an excellent fit of this latent construct (West et al. 2023). These empirical checks provided information regarding the validity and reliability of the individual measures (e.g., standardized factor loadings ranging from 0.61 to 0.83 and unstandardized loadings from 0.67 to 1.00, with all variables being statistically significant). Overall model fit statistics were very good, with the chi-square value being non-significant, while values for the Incremental Fit Index (IFI), Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI) were 1.00. The Root Mean Square Error of Approximation (RMSEA) was 0.00 (CI = 0.07, 0.14).

To determine whether farmers were worried about potential adverse impacts from agricultural activities, we asked farmers to indicate their level of concern that agriculture contributes to various environmental problems. To construct a latent variable of farmers' "awareness of agriculture's consequences," we combined measures of farmers' levels of concern that agriculture contributes to groundwater contamination, algal blooms in lakes, soil erosion, and climate change. These measures were selected due to their relevance to no-till, which can act as a potential solution for each issue. Farmers could express "low concern" to "high concern" for each consequence provided, with higher values corresponding to greater concern. Theoretically specified

[1]The component fit of an acceptable latent variable has standardized and unstandardized factor loadings close to one another, showing the measures are valid and reliable (the former above 0.4 and the latter around 1). Overall model fit statistics for an acceptable latent variable include a non-significant chi-square value (indicating that the estimated model is not significantly different from the data); values for the Incremental Fit Index (IFI), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) above 0.95; and a Root Mean Square Error of Approximation (RMSEA) below 0.05 (West et al. 2023).

correlated measurement errors were included. CFA results and fit statistics shown in Table A1 indicated an excellent fit.

We constructed "perceived behavioral control" as a latent construct that combined responses to five variables, with higher values indicating greater perceived obstacles to practice adoption. We asked farmers, "To what degree do you consider these factors as barriers that might discourage you from adopting new management practices?" Farmers were asked to consider potential barriers such as "lack of knowledge about a practice," "lack of the right equipment," "lack of technical assistance," "uncertainty regarding the benefits of a practice," and "leading to too many changes to their operation on a day-to-day basis" and rank each factor from "not a barrier" to a "strong barrier." This variable represented farmers' perceptions of how much control they have over their ability to implement new practices. Higher values suggested greater perceived barriers to be able to adopt a practice on their operation. Theoretically specified correlated measurement errors were included. Results shown in Table A1 indicated an excellent fit.

Farmers were also asked to rate their knowledge on environmental conditions pertinent to their farm. Topics included "building soil organic matter," "minimizing nutrient loss from fields," and "building soil health." Farmers could select from a five-item scale to indicate knowing "nothing at all" to "a great deal." Responses were added together, which resulted in an environmental knowledge variable that ranged from 3 to 15. Higher values on this additive scale indicated greater self-assessed knowledge.

Finally, farmers were asked whether looking after the environment was important for them as a farmer and for managing their operation. Farmers responded by choosing among five levels of agreement, from "strongly disagree" to "strongly agree." We included this observed variable as a measure of a farmer's environmental attitudes. Farmers were also asked about their intentions to pass on their farmland; this variable was measured by asking farmers if they expected a son, daughter, or other relative to take over the farming operation after they retired.

Demographics

We also measured several key farmer demographics, following previous studies (Beethem et al. 2023; Houser et al. 2019). Farming experience was measured by asking what year the farmer first became the primary decision-maker on their farm and then calculating the number of years between the year provided and the year of the survey. Educational attainment was measured according to four options, "less than high school," "high school diploma," "some college (including associate's degree)", and "bachelor's degree or higher." We recoded education into a dichotomous measure of whether farmers had an associate's, bachelor's and/or graduate degree. Finally, farm size was included as a control variable and took the value of 1 if a farmer operated more than 500 acres of land and 0 otherwise.

Modeling Technique: Structural Equation Modeling

To empirically test our model of the relations between social capital (i.e., network connections, network trust, and community norms) and no-till use, we used Structural Equation Modeling with Latent Variables (SEM) (Bollen 1989; Hoyle 2023). SEM is an analytical technique that can estimate path models with multiple latent and observed exogenous and endogenous variables simultaneously. Cognitive variables, including subjective conservation norms, awareness of consequences, perceived behavioral control, environmental attitudes, and environmental knowledge, were hypothesized to act as intervening variables in our analysis. Although we measured variables at two levels (individual and county), we employed a latent-manifest model because the county-level variable was drawn from a census, eliminating the need to account for sampling error when aggregating. Given the survey sampling design, we also calculated post-stratification weights using data from NASS's 2017 Agricultural Census and included them in our analyses to make the data more representative of the population. Weights were used to compensate for disproportionate distributions of farms due to intentional oversampling. We used Stata 16 software for data management and analysis.

Results

Descriptive Statistics

Table 1 presents descriptive statistics for variables in our empirical models. Thirty-eight percent of respondents reported using no-till regularly, while just over two out of five respondents (41%) reported using no-till sometimes. Farmers in our sample were socially connected, indicating contact with an average of 5.45 out of 7 information sources. Trust in sources was moderately high, with a combined average of 3.60 on the average 5-point trust scale. Normative no-till use averaged 38% of farms in our sampled counties.

Farmers in our sample were generally conscious about environmental issues. The average score for the environmental attitudes measure was 4.32 (on a 5-point scale), revealing that looking after the environment was important to operation management. Similarly, farmers scored highly on the subjective conservation norm indicators, indicating that environmental stewardship was important to the collective definition of good farming. Farmers also rated potential influences on their ability to implement new practices as moderate barriers, the greatest being a lack of the right equipment. On average, survey respondents had nearly 32 years of farming experience. About two-thirds of respondents planned to pass on their land to a relative after retiring. Over half of respondents had some college education, and 55% operated farms larger than 500 acres.

Structural Models

Table 2 shows results from our empirical models. Each column shows results for the endogenous (or outcome) variables as hypothesized, culminating in our final outcome variable, using no-till. Broadly, we found support for our hypothesized positive effects of social capital on no-till use. Social capital significantly affected farmer decision-making through knowledge, attitudes, and subjective conservation norms.

Our results indicated that being more integrated via network connections had a positive effect on environmental knowledge. Likewise, greater network connections and higher trust in information networks had positive effects on farmers'

Table 1. Descriptive Statistics (*N* = 1,523)

Variable	Mean	Std. Dev.	Min	Max
No-till use	2.161	0.748	1	3
Network connections	5.227	1.505	0	7
Network trust	3.594	0.588	1	5
Normative no-till use	0.382	0.096	0.140	0.781
Environmental attitudes	4.315	0.709	1	5
Environmental knowledge	10.772	2.065	3	15
Subjective conservation norms (latent)				
Thinks beyond their own farm to the social and ecological health of watershed	4.072	0.815	1	5
Minimizes soil erosion	4.435	0.652	1	5
Minimizes nutrient runoff into waterways	4.229	0.739	1	5
Puts long-term conservation of farm resources before short-term profits	3.951	0.794	1	5
Considers the health of streams that run through or along their land to be their responsibility	4.188	0.795	1	5
Perceived behavioral control (latent)				
Lack of knowledge	2.990	1.128	1	5
Uncertainty of benefits	3.265	1.027	1	5
Lack of the right equipment	3.487	1.191	1	5
Lack of technical assistance	2.842	1.102	1	5
Requires too many changes in my daily operation	3.049	1.090	1	5
Awareness of consequences (latent)				
Soil erosion	3.869	0.985	1	5
Groundwater contamination	3.356	1.101	1	5
Algal blooms in lakes	3.286	1.122	1	5
Climate change	2.423	1.207	1	5
Farming legacy (pass on land after retirement)	0.678	0.467	0	1
Years of farming experience				
0–23 years	0.272	0.445	0	1
24–35 years	0.259	0.438	0	1
36–44 years	0.262	0.440	0	1
45+ years	0.202	0.402	0	1
Have a college education	0.609	0.488	0	1
Farm size ≥500 acres	0.555	0.497	0	1

expression of environmental attitudes. All three measures of social capital—network connections, network trust, and community conservation norms—positively affected the expression of subjective conservation norms. Finally, network trust positively affected farmers' expressed awareness of consequences or concern about agriculture's impacts on environmental challenges. Together, these results show that social capital as captured in social connections, trust in those connections, and community norms influenced farmers' internal cognitive processes in many ways. By expanding the typical individually-focused model to include inter-individual processes, we revealed the weight these social processes carry in farmer decision-making surrounding no-till use.

Results in the final column of Table 2 show direct effects on farmers' adoption of no-till. Subjective conservation norms promoted the use of no-till, while greater perceived barriers to practice adoption (e.g., lacking knowledge, technical skills, increased uncertainty) inhibited the adoption of no-till. Having a college education

Table 2. SEMLV with Unstandardized Effects (*N* = 1,523)

	Environ. Knowledge	Environ. Attitude	*Sub. Conserv. Norms*	*Perceived Behavioral Control*	*Awareness of Consequences*	No-Till Use
Social capital						
Network connections	**0.354**** (0.048)	**0.043**** (0.016)	**0.045***** (0.016)	0.007 (0.024)	–0.010 (0.009)	0.025 (0.017)
Network trust	0.080 (0.121)	**0.160**** (0.042)	**0.218***** (0.043)	–0.017 (0.065)	**0.103**** (0.036)	0.013 (0.042)
Normative no-till use	0.306 (0.683)	0.208 (0.239)	**0.589*** (0.280)	–0.131 (0.373)	–0.331 (0.313)	–
Cognitive variables						
Environmental attitudes	–	–	–	–	–	–0.020 (0.038)
Environmental knowledge	–	–	–	–	–	0.008 (0.012)
Subjective conservation norm	–	–	–	–	–	**0.183***** (0.047)
Perceived behavioral control	–	–	–	–	–	**–0.055**** (0.025)
Awareness of consequences	–	–	–	–	–	0.010 (0.034)
Demographics						
Farming legacy	0.059 (0.135)	**0.120**** (0.046)	–0.058 (0.044)	–0.097 (0.070)	–0.023 (0.048)	0.079 (0.051)
Experience: 1–23 years	–	–	–	–	–	–
Experience: 24–35 years	0.176 (0.174)	0.101 (0.056)	0.074 (0.064)	0.096 (0.090)	0.066 (0.073)	0.016 (0.062)
Experience: 36–44 years	**0.503**** (0.172)	0.041 (0.060)	0.046 (0.065)	–0.073 (0.087)	0.095 (0.073)	0.011 (0.063)
Experience: 45–72 years	**0.496**** (0.186)	0.030 (0.067)	0.118 (0.064)	**–0.216*** (0.105)	0.096 (0.079)	–0.029 (0.072)
Have a college education	0.040 (0.136)	–0.056 (0.046)	–0.025 (0.050)	–0.086 (0.054)	**0.222**** (0.071)	**0.096*** (0.049)
Farm size ≥500 acres	0.095 (0.120)	**0.110**** (0.041)	–0.064 (0.018)	0.091 (0.063)	–0.073 (0.069)	–0.071 (0.045)
R-squared	.084	.057	.066	.017	.021	.093
SRMU	0.060					

Note: Models include controls for state (not shown); standard errors are in parentheses. Bold values indicate significance at the α = 0.05 level.
*p < .05; **p < .01; ***p < .001.

also positively affected no-till use. These findings support our second hypothesis, articulating the effects of intra-individual processes on the adoption of no-till among farmers. Notably, such effects included both practical management considerations and affective normative elements.

Demographic measures revealed a handful of significant effects on cognitive variables consistent with the literature. For example, greater farming experience (both 36–44 years and 45 or more years) had a positive effect on environmental knowledge but a negative effect on perceived behavioral control. A commitment to passing on the farming legacy, as well as a larger farm, had positive effects on farmers' expressed environmental attitudes. Farmers with college experience had a higher awareness of agriculture's negative impacts.

To further elaborate on how social capital shapes farmer decision-making, we have included the standardized direct, indirect, and total effects of variables in our model in Table 3. Standardized effects express results in terms of standard deviations, such that the relative effects on the endogenous variable can be meaningfully compared. The first two columns provide standardized direct effects, which allowed us to contrast the relative performance of the individual measures on farmers' use of no-till.

Our model revealed that subjective conservation norms had the largest effect (0.168), while perceived behavioral control had the second largest standardized effect (−0.073). Combined, they revealed support for the importance of intra-individual processes on the decision to adopt no-till. Yet these intra-individual variables were affected by social capital measures in the context of the full model. For example, network connections (0.254) had the largest standardized direct effect on environmental knowledge, while network trust had the largest standardized direct effect on environmental attitudes (0.137). Our measures of social capital represented the three largest effects on subjective conservation norms out of all variables included in the model, with network trust having the strongest effect (0.191), followed by network connections (0.098) and normative no-till use (0.078). Overall, Table 3 highlights the importance of a farmer's network connections and trust in networks, which can influence their use of no-till indirectly through other elements in their decision-making process. Figure A1 reinforces these findings, revealing pathways to no-till adoption and the complexities of farmer decision-making.

Discussion

In this study, we used survey data from row crop farmers in the US Corn Belt to demonstrate how social capital is highly relevant to farmers' decisions regarding no-till adoption. We incorporated social capital into our conceptual model using three measures: farmers' social networks, network trust, and community conservation norms. Given the limited operationalization of social capital within the practice adoption literature, we examined different forms of social capital at play while identifying potential mechanisms by which social capital affects no-till adoption. Our analysis contextualized farmers' internal cognition concerning practice adoption by showing that social capital facilitated their ability and willingness to implement no-till.

Table 3. SEMLV Results with Standardized Coefficients (N=1,523)

	No-Till Use		Environ. Attitude	Environ. Knowledge	*Sub. Conserv. Norms*	*Perceived Behavioral Control*	*Awareness of Conseq.*
	Direct	Total	Direct	Direct	Direct	Direct	Direct
Social capital							
Network connections	0.048	0.068	0.090	0.254	0.098	0.011	–0.015
Network trust	0.010	0.042	0.137	0.023	0.191	–0.010	–0.065
Normative no-till use	–	0.013	0.027	0.013	0.078	–0.012	–0.026
Cognitive variables							
Environmental attitudes	–0.019	–0.019	–	–	–	–	–
Environmental knowledge	0.023	0.023	–	–	–	–	–
Subjective conservation norms	0.168	0.168	–	–	–	–	–
Awareness of consequences	0.012	0.012	–	–	–	–	–
Perceived behavioral control	–0.073	–0.073	–	–	–	–	–
Demographics							
Farming legacy	0.049	0.048	0.079	0.013	–0.016	–0.045	–0.012
Years of experience: 24–35 years	0.009	0.014	0.062	0.037	0.046	0.042	0.032
Years of experience: 36–44 years	0.006	0.016	0.024	0.102	0.028	–0.031	0.043
Years of experience: 45–72 years	–0.015	0.004	0.017	0.094	0.067	–0.084	0.041
Have a college education	0.060	0.061	–0.037	0.009	–0.017	–0.016	0.101
Farm size ≥500 acres	–0.043	–0.055	0.072	0.021	–0.039	0.042	–0.037

Our measures of network connections and network trust did not produce significant direct effects on farmers' use of no-till (Hypothesis 1), but instead intervened in the form of indirect effects (Hypothesis 3). While the lack of direct effects of social capital on no-till use was surprising, it may be that bridging and bonding social capital work in opposing ways to influence practice adoption. Future research should seek to establish these patterns regarding how behaviors change or remain the same. Subjective conservation norms were shown to promote the adoption of no-till. Community conservation norms acted through individual subjective conservation norms to impact farmers' use of no-till. Since subjective conservation norms are composed of farmers' perceptions of what it means to be a "good farmer," this result suggests a mechanism linking forms of social capital with cognitive measures. Similarly, Cho and Kang (2017) argue, "If social norms are a by-product of the functioning of social capital on a larger scale, such person-level normative influences may actually be effects lying on the causal path between group-level social capital and environmental behavior" (Cho and Kang 2017:289). The link between no-till adoption and social constructions of a "good farmer" may be internalized by farmers via their connections with information sources, their trust in those relationships, and their overall perception of local cultural norms. These findings also align with previous research showing that the mechanism between norms and cognitive processes allows farmers to interpret and adapt conservation practices to fit their specific circumstances (Coulibaly et al. 2021).

In our model, normative no-till use produced the largest effect on subjective conservation norms. Importantly, norms do not occur in a vacuum. Burton (2004) conceptualizes individuals adopting the identity of a farmer as a process that involves accepting one "is a farmer" while simultaneously understanding and practicing behaviors compatible with what "farmers do" (Burton 2004:198). In other words, individuals are socialized to ideas of what a good farmer means and do their best to act out this role accordingly. For example, beginning in the 1940s, being a good farmer in the United Kingdom meant committing to a production orientation that "enabled farmers to claim a high social position as caretakers of the nation's food supply" (Burton 2004:195). When meanings associated with productivity approaches shifted beginning in the 1980s, some farmers struggled to transition their operations in a way that aligned with a "good farmer" identity.

Accordingly, norms regarding "good farmer" identities are maintained by farmers, who pass on these norms through recurring cycles of socialization. However, socialization cannot occur without the existence of social networks. The significance of network connections' indirect effect on subjective conservation norms suggests that farmers in our sample are not only networked, but might also exchange social capital in a way that asserts mutual influence on decisions to adopt no-till. Social networks exemplify an interesting tension in that they are a collective unit of analysis, yet networks are impossible without individual actors. Network behaviors can likewise be likened to a "gatekeeper role" that has the potential to align a farmer to local versions of the "good farmer" identity (Rust et al. 2020). That is, network connections acting through subjective norms can be likened to a mechanism between a farmer's friends, colleagues, and peers, and individual interpretations of their social network's behaviors. Implementing a network's normative practices can also generate social capital for farmers who use them, possibly increasing their standing among peers.

Network trust was also significantly and positively associated with farmers' perceptions of "good farmer." Given its measurement, our findings suggest that higher levels of trust associated with a farmer's social network may be linked with a higher likelihood to adopt no-till. Rust et al. (2020) note that "trust is a key attribute of social capital, as high social capital can promote trust between people, which in turn promotes collective action" (Rust et al. 2020:6). In other words, the presence of trust indicates that farmers' adoption of no-till may reflect a perception of no-till as a shared or collective activity, like Miao et al. (2018), who found that trust among high-income farmers in Guangling County, China was critical for cooperation on small-scale irrigation projects. Likewise, Ghorbani et al. (2022) found that high trust within and between groups of rural women in southwestern Iran helped maintain their livelihood in dairy production and contributed to community resiliency.

The difference between farmers acting in accordance with what it means to be a "good farmer" as implied by social networks and norms, and farmers acting on trust to maintain their community, is subtle but important to distinguish. Despite subjective conservation norms having a strong, positive, and significant effect on the adoption of no-till in our model, we are not suggesting that farmers only act to preserve their reputation as "good farmers." As the positive and significant effect from network trust on subjective conservation norms suggests, farmers are also motivated to impart and act on trust within their community. As mentioned, trust as a form of social capital remains understudied in the adoption literature. Our findings show that trust has a role in connecting farmers with their "in-group," that adopting conservation practices to maintain their in-group may be appended to any individual motivations that farmers must adopt, and that there is still plenty to examine when it comes to trust informing farmers' actions.

We also found significant and positive effects from network connections on environmental knowledge, suggesting that networks are an important source of the mutual exchange of knowledge. Our model also revealed effects from network connections and network trust on environmental attitudes, which coincides with other studies that have examined the affective impacts of social interactions between farmers and other actors (Baumgart-Getz, Prokopy, and Floress 2012; Liu, Teng, and Han 2020; Miao et al. 2018; Mills et al. 2017; Peters 2019). More frequent social interactions and higher trust in social relationships have also been shown to build farmers' knowledge regarding relevant management practices such as no-till (Ingram 2010). We emphasize that a larger and more diverse social network implies more options *and* more opportunities for a farmer to connect, learn, and be affirmed by other agricultural stakeholders. In other words, knowledge may be a key component of a farmer's decision to adopt, but it is incumbent on the farmer to seek and apply the knowledge they gain. As discussed, the application of knowledge is also contingent on a farmer's interpretation of local normative practices.

Taken together, our findings indicate that farmers are situated such that they abide by norms and can also perpetuate norms through their networks regarding what it means to be a "good farmer." However, greater levels of trust for members of their social network might intensify farmers' adherence to these norms. When such norms involve implementing conservation practices such as no-till, farmers are more likely to adopt themselves and become part of the mechanism that transforms community conservation norms to actual practice on the land. As Burton (2004) suggests, such insights would remain invisible if farmers' decisions are decoupled from the contexts in which they are made.

Centering Social Capital in Farmer Decision-Making

Our findings demonstrate multiple ways that social capital contributes to mechanisms linking social and collective forces to farmers' practice adoption decision-making. They also demonstrate that social capital is an expansive resource that farmers can draw from to evolve their management processes in ways that adhere to local culture and bolsters a sense of belonging, in addition to managing their land well. Our results do not imply that social capital is the only or even the most important factor in farmer decision-making. Rather, our findings show that intra-individual constructs motivating practice adoption can be developed through diverse channels (Hypothesis 2). For example, a farmer may independently have strong subjective conservation norms, and even with low levels of social capital may decide to use no-till. Additionally, farmers could gain environmental knowledge through their own experience with their land. However, we stress that integrating social capital in conservation practice adoption research can be a rich opportunity to examine how farmers' social contexts can be leveraged to influence their decision-making.

An important insight derived from our model involves recognizing that the people, organizations, and agencies in farmers' networks may be perceived as more than just sources of information. For example, our social capital measures produced no significant effects on perceived behavioral control, that is, a farmer's determination of feasibility regarding practice adoption. While a farmer's perceived behavioral control influenced their use of no-till, social capital does not appear to be influencing farmers' perceptions of their ability to implement practices. This suggests that the social capital exchanged through network connections, trust in those connections, and community norms is unrelated to a farmer's judgment of the viability of a practice on their operation. As we have argued, a farmer's decision to adopt may be less influenced by individual calculations and more by exchanges of social capital that allow farmers to comply with the normative expectations of their peers and other connections. This is a novel finding considering that previous studies tended to incorporate social factors as separate and discrete constraints on farmers (Montes de Oca Munguia, Pannell, and Llewellyn 2021; Yoder et al. 2019; Zeweld et al. 2017).

One strength of examining the causal pathways of social capital is it allows us to see possible bottlenecks on adoption. We sought to examine whether social capital would influence farmer behavior through a variety of previously proposed pathways, including the provision of practical information for implementation, financial or physical resource provision, or through influences on social conservation norms. Our results reveal a crucial finding that subjective norms are the only significant pathway through which social capital operates. This means that farmers' norms, as influenced by their network connections, are an important element of adoption yet independent of their perceived ability to implement the behavior, which is neither influenced by networks nor influential on adoption. That is, networks might not equip farmers with the physical equipment or financial capital needed to implement practices. Rather, they inform farmers about what their peers are doing, what their peers expect them to do, and what it means to be good at their profession. Regarding adoption, this suggests that efforts to provide financial or technical assistance (e.g., cost share, technical information from extension) may be reaching their limits on what they can do to increase adoption, and may be encountering normative barriers that are more deeply rooted and slower to change.

Another insight centers on the relationship between social capital and environmental attitudes. The alignment between these variables may seem intuitive since the affective factor of trust coincides with the similarly affective factor of attitudes. However, while scholars have pushed to move beyond models of farmers as rational actors, few studies have explored the ways that information sources impact farmers beyond information provision. If trust in key agricultural stakeholders can indeed sway farmers' hearts as well as their minds, then communication from sources like extension and government agencies may do more to achieve conservation goals if they can tap into such affective elements. This may start with intentional efforts to build trust and rapport with farmers to establish meaningful social connections. Then, these trusted stakeholders can engage farmers in conversations in which factors like subjective norms of good farming and attitudes toward conservation or specific practices are targeted.

Our findings suggest that forms of social capital hold the potential to shape key motivators of practice adoption, including constructs of "good farmer" and a farmer's sense of community. Notably, an aging farmer population and increased land consolidation in the US means that networks, trust, and norms are shifting at numerous levels and remain susceptible to top-down influences (Rust et al. 2020). Continuing trends in privatization (e.g., Duncan et al. 2021; Wolf 2006) suggest that stakeholders promoting conservation may have more competition for defining norms of farming than ever before. Thus, there is urgency that farmers and their networks actively recognize their own participation in constructing the meanings and norms associated with conservation practice adoption and use such processes as strategies to promote the practices they find most beneficial to their operations and land.

Importantly, our work has limitations that offer opportunities for future research. First, some explanatory variables in our model do not explicitly address attributes of no-till nor its perceived consequences, limiting its predictive ability (Epanchin-Niell et al. 2022), so future models should strive to include these variables. Farmer tillage behavior is complex, and while our model sought to examine use within a single year, many farmers rotate practices over multi-year cycles or alter their behavior over time. Future work should examine tillage practices through a broader temporal lens, accommodating for crop rotations, discontinued no-till use, and indicators of potential future use. Further, while we aimed to highlight the importance of social capital and demonstrate potential pathways influencing farmer behavior, quantitative measures of social capital remain imperfect. Elements such as social capital (including bonding and bridging forms), norms (including forms like descriptive, subjective, and injunctive), and identity are overlapping, interconnected, and multifaceted. Qualitative work may be necessary to disentangle these elements and map their relationship to conservation behavior, especially regarding how farmer identity and social capital might adhere to or resist practice norms.

Conclusion

If the goal of conservation practice adoption research is to increase uptake from farmers, then related scholarship should acknowledge that significant barriers to conservation practice adoption may also be social in nature. Our results offer insights into these social barriers and suggest potential pathways to expand conservation adoption. One implication is the need to appeal to farmers' professional identity and status as a community member, a good farmer, and an agricultural expert. Enhancing similar meanings attached to the visible adoption of other agricultural management practices, such as cover cropping and product diversification, might incur more mileage in affirming a farmer's sense of identity and thus make it more likely that adoption occurs.

Embedding farmers in their social contexts also requires consideration of political, economic, and cultural influences on conservation decision-making. For example, political constraints may include industry regulations or limited allocations of public funding to support programs offering financial incentives for practice adoption. Economic conditions also provide short- and long-term incentives and constraints for certain modes of farming, practices, inputs, and technologies. As noted in our findings, these conditions also intersect with community norms; some norms might align a farmer closer to adopting conservation practices, while otherwise might dissuade such actions. Previous models examining farmer characteristics and their effects on practice adoption often take these larger contexts for granted, but neglecting this complexity leads to an incomplete picture of farmers' everyday decisions.

More broadly, a sociological approach to investigating farmer decision-making and conservation adoption has the benefit of bringing in other stakeholders. Policymakers, international markets, local industries, and third-party technology vendors have major effects on the political and economic conditions that farmers must navigate. They also have a role in crafting opportunities in which farmers' adoption of conservation practices make the most sense for their production goals and for maintaining social status in their community. In other words, the "problem" of practice adoption should not be perceived as farmers choosing to adopt or not adopt (Pannell and Claassen 2020). Rather, a sociological approach emphasizes that ideas about how conservation can be pursued effectively are a result of the knowledge, intentions, and actions of multiple actors, among which farmers are just one.

Our findings offer guidance for future projects wishing to incorporate this complexity. One approach might involve situating farmers' decision-making as collective knowledge production, with other actors intervening on the knowledge being constructed and applied within agricultural production. Another approach could involve a deeper investigation of farmers' association with the "good farmer" identity. Burton (2004) has discussed farmers' resistance to adopting other identities, even when provided with financial incentives to act differently. At the same time, farmers are versatile professionals, and their decision to adopt or not adopt also depends on decisions made while wearing other hats. Investigating the complexities and contradictions embedded within notions of what it means to be a good farmer would further clarify the role of mechanisms in farmers' decision-making. These suggestions reflect a sociological approach to conceptualizing conservation practice as a result of network connections, network trust, and communities of conservation that can promote the adoption of conservation practices through multiple affective paths by jointly building on social and individual motivations.

Conflict of Interest Statement

No potential conflict of interest was reported by the authors.

Data Availability Statement. The data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX

Table A1. Component Fit and Overall Model Fit Statistics for Latent Variables

Overall Model Fit	Chi-sq	*p*	TLI	IFI & CFI	RMSEA
Subjective conservation norms	0.060	0.806	1.002	1.000	0.000
Perceived behavioral control	1.089	0.297	1.000	1.000	0.006
Awareness of consequences	2.591	0.107	1.000	1.000	0.027

Component Fit	Std. Factor Loadings	Unstd. Factor Loadings	Reliability Estimates (SMC)
Subjective conservation norms			
Thinks beyond their own farm to the social and ecological health of their watershed	0.829	1.000	0.687
Minimizes soil erosion	0.690	0.669	0.475
Minimizes nutrient runoff into waterways	0.689	0.758	0.474
Puts long-term conservation of farm resources before short-term profits	0.611	0.713	0.373
Considers health of streams that run through or along their land to be their responsibility	0.698	0.821	0.488
Perceived behavioral control			
Lack of knowledge about the practice	0.877	1.000	0.770
Uncertainty of benefits	0.642	0.682	0.412
Lack of the right equipment	0.643	0.773	0.413
Lack of technical assistance	0.707	0.795	0.500
Req. too many changes in daily operation	0.619	0.684	0.383
Awareness of consequences			
Groundwater contamination	0.919	1.000	0.844
Algal blooms in lakes	0.798	0.890	0.637
Soil erosion	0.617	0.601	0.380
Climate change	0.485	0.581	0.235

Note: $N = 1{,}523$.

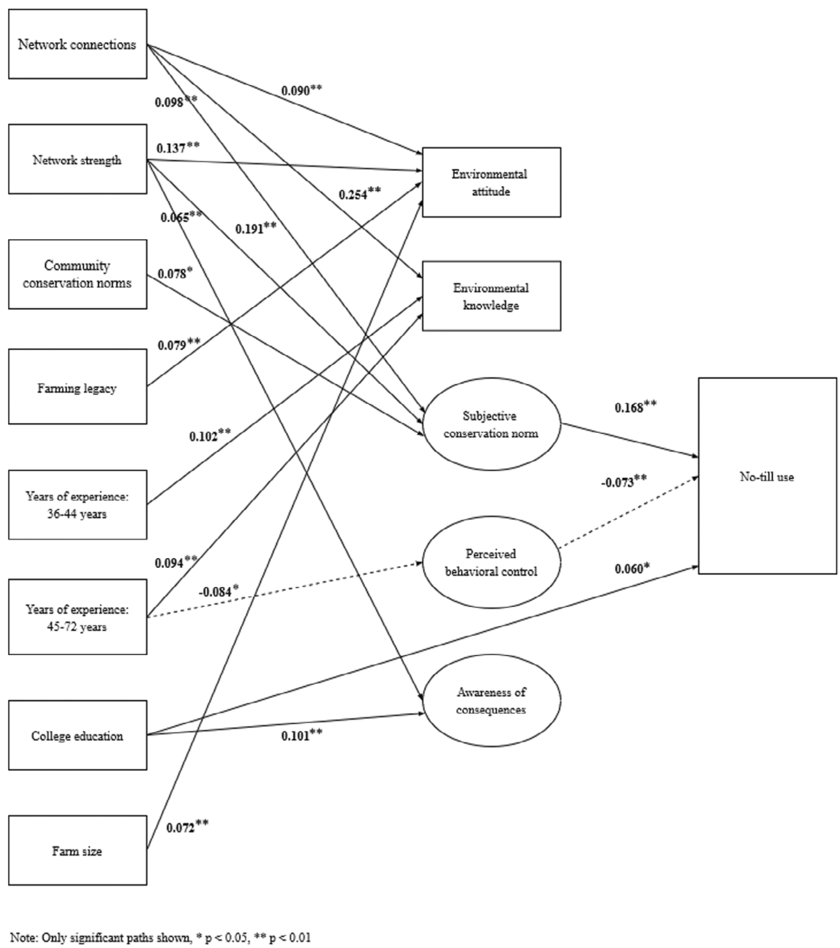

Figure A1. Path Model with Standardized Coefficients for Significant Parameters. Only significant paths shown, *$p<.05$; **$p<.01$.