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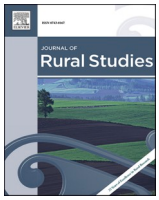

Participation in individual and collective agri-environmental schemes: A synthesis using the Theory of Planned Behaviour

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ABSTRACT

Understanding the behavioural factors that influence farmers' intentions to participate in agri-environmental schemes is crucial for delivering sustainability in agricultural landscapes. Drawing on a qualitative synthesis approach, we seek to understand the underlying motivations behind farmers' decisions to engage with individual as well as collective agri-environmental schemes. We systematically map qualitative evidence on behavioural factors in farmers' decision-making using an expanded Theory of Planned Behaviour framework, incorporating trust and legitimacy elements. Our analysis highlights the role of farmer attitudes in individual schemes. Subjective norms influenced by the farming community, and trust in policy-making processes, were crucial factors determining participation in collective schemes. Normative legitimacy, contract complexity and inflexibility, as well as financial and non-financial outcome beliefs, were key barriers to participation in both types of schemes. Based on our findings, we recommend prioritizing interventions that foster institutional and relational trust. Low levels of trust are linked to barriers caused by subjective norms in both collective and individual schemes. Creating opportunities for social interactions and learning can be essential to foster social capital and trust. Policy development should acknowledge the potential relevance of the broader community context in shaping farmer's attitudes, and particularly its relevance in overcoming barriers linked to cognitive legitimacy, to improve both individual and collective participation in agri-environmental schemes.

1. Introduction

In recent decades, environmental considerations have been increasingly integrated into agricultural policies (de Putter 1995; Baylis et al. 2008; Pe'er et al. 2022). Despite the considerable potential of agri-environmental schemes to enhance biodiversity and deliver positive environmental outcomes (Reidsma et al. 2006; de Graaff et al. 2019; Dessart et al. 2019; Pe'er et al. 2022), farmers' participation in these schemes often fails to meet expectations (Taylor and Van Grieken 2015; Hasler et al. 2022). It is therefore imperative to understand the behavioural factors that influence farmers' decision-making processes and their intention to participate in agri-environmental schemes, both individual as well as collective schemes (Pe'er et al. 2022). This understanding is key to design cost-effective policy instruments (Dessart et al. 2019; Wang et al. 2023) that respond to goals such as those formulated in the EU Farm to Fork Strategy (Schebesta and Candel 2020). Behavioural factors are relevant for participation in both types of agri-environmental schemes, but may be more pronounced for collective schemes, given the challenges of collective action and collaboration (Pendergraft 1998; Prager 2015; Mayer and Smith 2019; Sok et al. 2021; Villamayor-Tomas et al. 2021).

Behavioural factors,[1] are the component parts or processes that underly decision making and the intention towards behaviour, i.e., cognitive, emotional, personal, and social processes (American Psychological Association 2018). Analysing factors underlying behaviour is challenging because human decision-making is complex and is not necessarily deterministic (Schlüter et al. 2017; Dessart et al. 2019). Indeed, most literature reviews on factors influencing farmers' decisions

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[1] The term behaviour does strictly speaking refer to action (American Psychological Association 2018). But we also follow the definition used in the economic behavioural literature, e.g. in Schaub et al. 2023; Dessart et al. 2019.

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to participate in agri-environmental schemes have avoided explicitly addressing behavioural factors, and instead have tended to focus on external economic, demographic, or structural agricultural and environmental factors (Siebert et al. 2006; Lastra-Bravo et al. 2015). Individual behavioural factors relating to farmers' perceptions have thus often been ignored, as is the socio-cultural context within which farmers make their decisions (Garforth and Rehman 2006). Moreover, the few available reviews that do consider behavioural factors focus exclusively on quantitative literature (e.g., statistical analysis based on census or survey data) and do not consider findings from qualitative studies (Dessart et al. 2019; Schaub et al. 2023). Behavioural factors are not, however, readily measurable and quantifiable, and this can pose analytical difficulties, especially in uncontrolled, contextual settings. For instance, Schaub et al. (2023) found that many behavioural factors are not consistently related to participation.

In complementing quantitative studies, qualitative research has the potential to uncover the reasons behind decision outcomes, and can identify individual perceptions that arise from emotions, cultural backgrounds, and traditions Harris et al. (2009); Zoellner et al. (2012); Van Bavel and Dessart (2018) emphasized the importance of qualitative behavioural studies in policymaking, particularly in providing a holistic and nuanced understanding of participant perspectives. This approach allows researchers to explore complex behavioural phenomena in depth, develop new theories, and gain insights based on participant perspectives and contextual factors. Qualitative research is therefore essential in behavioural science, offering a more comprehensive understanding of complex social phenomena.

Using a systematic review, we synthesize results of qualitative literature (i.e., using participant observations and open-ended interviews), and highlight the behavioural factors that influence farmers' decisions to participate in agri-environmental schemes. In this setting, we outline which factors are especially relevant in participation in collective schemes. We use the Theory of Planned Behaviour (TPB) (Ajzen 1991) to provide a standard conceptual and methodological framework to extract, analyse, and synthesize information. The TPB aims to understand how beliefs arising from attitudes, subjective norms, and perceived behavioural control (i.e., perceived ability), directly or indirectly influence behaviour. Burton (2004) advocates using the TPB as it focuses on attitude-behaviour relationships and includes normative influences. While the factors of the TPB are well defined, as a generic theory it provides considerable flexibility (Schlüter et al. 2017), by allowing the integration of a wide spectrum of factors affecting decision-making, ranging from general concepts to specific behaviours (Burton 2004; Siebert et al. 2006). The TPB acknowledges that behaviour is influenced by diverse behavioural factors (Sok et al. 2021), and it is widely used in psychology to understand and predict human behaviour. As a result it has been used to guide policy interventions aimed at behaviour change (e.g., Ajzen and Klobas 2013; Lareyre et al. 2021; Wang et al. 2021), specifically agri-environmental policymaking (Schroeder 2015), understanding farmers' decisions on pesticide usage (Ataei et al., 2021), or transitioning to more sustainable and diverse production systems (Senger et al., 2017).

We thus contribute three-fold. First, there is a strong opportunity for qualitative studies to provide a nuanced understanding of perspectives for behavioural research, which is particularly informative for agri-environmental policy, where scholars struggle to depict a thorough picture of the aspects of participation (Dessart et al. 2019).

Second, our research sheds light on the behavioural dimensions of participation in collective agri-environmental schemes, an area that has received limited attention thus far. Understanding these behavioural aspects is crucial in effectively addressing ecological targets and achieving desired environmental outcomes.

Third, the TPB also enables us to assess factors across studies and policy frameworks (Burton 2004; Schlüter et al. 2017), thereby contributing to theory building, especially when working with underused qualitative information. To the best of our knowledge, the TPB has not been previously employed to synthesize qualitative studies on participation in agri-environmental schemes. Hence, we can create a comprehensive and innovative model outlining the behavioural factors influencing agri-environmental scheme participation.

2. Background and conceptual framework

2.1. Behavioural aspects of individual and collective agri-environmental schemes

We interpret agri-environmental schemes as policies that encourage farmers to produce environmental services or reduce negative environmental externalities (e.g., Baylis et al., 2008). These policies focus, for instance, on reducing greenhouse gas emissions, safeguarding biodiversity, and restoring deteriorated agricultural ecosystems. Agri-environment schemes can generally take two forms: action-based or results-based,[2] and can focus on the individual farm or a group of farms. Participation in these different scheme types may be influenced by distinct behavioural factors, reflecting their unique dynamics (Falconer 2000; Schaub et al. 2023).

In action-based schemes, farmers are paid to implement certain practices, while in results-based schemes farmers are compensated for delivering predetermined environmental outcomes (Elmiger et al. 2023). Result-based schemes may offer greater motivation for farmers to participate, as they are free to choose the means to achieve the results with fewer restrictions and regulations (Russi et al. 2016; Wezel et al. 2018; Elmiger et al. 2023). They do, however, have increased risk for farmers due to uncertainties of delivering the expected environmental outcomes (Burton and Schwarz 2013). Most of the schemes, both action- and result-based, are aimed at the individual farm level. Nevertheless, collective or community-based schemes are being increasingly proposed and integrated into policy (Kuhfuss et al. 2019; Pe'er et al. 2022). From a landscape-ecology perspective, it is important to consider multiscale processes and factors that affect environmental outcomes, and these will often transcend the farm management unit (Macfarlane 2000; Tscharntke et al. 2005), especially given that ecosystem services mediated by biodiversity responds to landscape scale patterns and processes (Le Provost et al. 2023), as do populations of many vertebrate species, and particularly birds (Kuhfuss et al. 2019). Collective agri-environmental schemes incentivise groups of farmers to engage in coordinated action towards common environmental objectives that can be delivered at landscape scales. These incentives can take various forms, such as agglomeration bonuses (Banerjee 2018), access to markets that are only possible through collective efforts (Westerink et al. 2020) or payments organised through a collective (Del Corso et al. 2017).

2.2. Extending TPB with trust and legitimacy for agri-environmental scheme participation

To map and analyse factors that influence the motivation and actual participation in agri-environmental schemes, we use the Theory of Planned Behaviour (TPB) (Ajzen 1985, 1991). The TPB assesses how attitudes, subjective norms, and perceived behavioural controls influence the intention to engage in specific behaviours (Fig. 1). The first factor refers to the attitudes towards a certain behaviour which are shaped by a person's belief about the behaviour's outcome, and which can be positive or negative. The most influential beliefs are assessed by the strength of the outcome belief and its evaluation (Sok et al. 2021). The second factor refers to subjective norms which consider the influence of others on the person who acts, i.e., how one is perceived by others (normative beliefs) and how this perception influences the actor.

[2] A combination of both schemes exists as well, so called hybrid schemes (Zabel and Roe 2009; Elmiger et al. 2023).

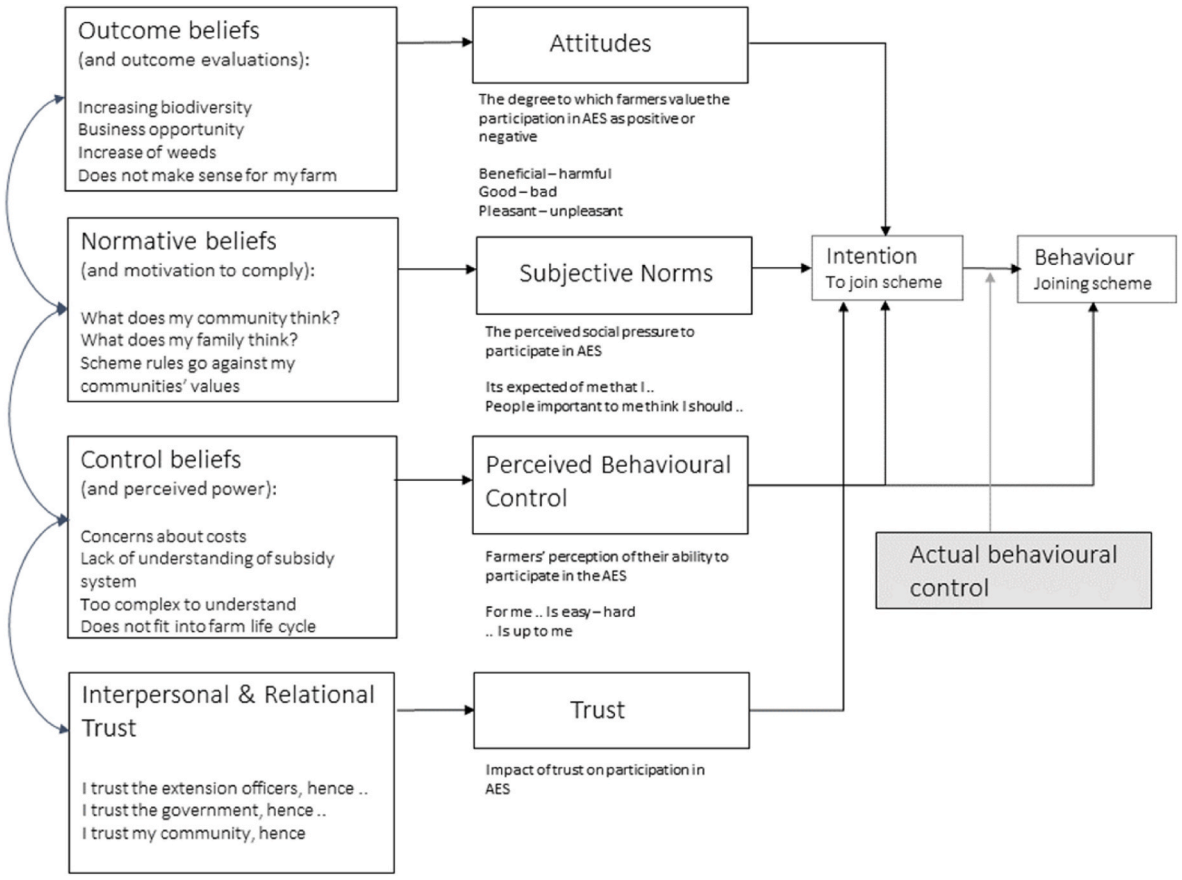

Fig. 1. Conceptual framework of the TPB extended by trust (adapted from Ajzen, 1991; Schroeder, L.A. 2015).

The intensity of subjective norms in relation to the intention to act depends on the actor's motivation to comply with the person in question (Sok et al. 2021). The third factor, perceived behavioural control, refers to actors' perceptions of their ability to act, their control beliefs, and their perceived power. Believing that one can act is strongly associated with actually acting (Wallston 2001). Perceived behavioural control is often used as a proxy for the actual behavioural control (e.g., time or money limitations) of carrying out the behaviour (Sok et al. 2021). Thus, it acts as a moderator on the effects of social norms and attitudes on the intention to engage in a certain behaviour.

For this study, we use an extended version of the original TPB that also includes elements of legitimacy and trust. Extending the TPB by including trust has been done in several studies, although in different contexts, specifically in consumer choice studies (Mazzocchi et al. 2008; Giampietri et al. 2018). Trust is recognized to be important in the management of natural resources (Stern and Coleman 2015), and also in the context of agricultural policy (Rothstein 1998; De Vries et al. 2019). Achieving behavioural change through agri-environmental schemes entails a certain amount of trust in the scheme, the connected institutions, or the advisory services (Sutherland et al. 2013). In this study we focus on relational trust (e.g., trust in the specific extension agent or trust in the farming community) and institutional trust (e.g., trust in the implementing institution/agency or governing body). Additionally, we use the concept of legitimacy to analyse the factors of attitude and subjective norms (Fig. 1 outcome beliefs and normative beliefs) of the TPB (Thomas and Lamm 2012). Suchman (1995) defines legitimacy as 'a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed norms, values, beliefs, and definitions' (p. 574). Legitimacy has an internal component (cognitive legitimacy), which is a person's personal evaluation of a behaviour, this fits into attitudes. The external component of legitimacy (normative legitimacy) refers to the social influences affecting whether to engage in a behaviour, and hence fits into subjective norms. Thus, legitimacy matches the factors of attitude and subjective norms of the TPB (Thomas and Lamm 2012). Legitimacy can be split into three major themes: Cognitive legitimacy, which relies on reasoning; moral legitimacy, which considers whether the behaviour is the right thing to do; and pragmatic legitimacy, which refers to how a particular response would affect the decision maker (Suchman 1995).

Synthesizing qualitative research using an extended TPB provides a structured approach for consistently combining previous research. The articles used for this study seldomly applied a conceptual framework (Table A1), but rely on inductive approaches more suitable for researching completely new contexts (Bernard 2017; Ng et al. 2022). In agri-environmental policy research, synthesizing qualitative information can help integrate behavioural factors into policymaking.

3. Methods and data

3.1. Data collection

The collection of qualitative studies for our study was done alongside the systematic review of Schaub et al., (2023). While Schaub et al., 2023 excluded qualitative studies, we instead focused on qualitative works. The systematic review was divided into four steps: (1) identification of the main research question (2) identification of the relevant studies using predefined criteria and screening process; (3) data extraction; and (4) comparison and synthesis of the data (see Schaub et al. 2023).

The Boolean search string was conducted in two steps. We first used terms referring to the search target: farmers, agri-environmental practices, and environmentally friendly practices (Table A4). Second, we undertook text mining and keyword co-occurrence networks of tiles,

abstracts, and references to find unidentified search terms and eliminate eventual biases by the search terms (Grames et al. 2019). Three databases were used for the search: CAB Abstracts and Global Health (access via Web of Science), Web of Science Core Collection (access via Web of Science), and Scopus (access via Elsevier). After checking for duplicates using EndNote the final reference list contained 3523 unique items (Schaub et al., 2023).

The eligibility criteria of Schaub et al. (2023) are that (1) studies needed to consider behavioural factors and/or opportunity costs in farmers' decision to participate in a scheme, (2) analysed farmers decisions in Australia, Europe, and North America (Canada and USA), (3) investigated commercially and formally market-oriented specialized and mixed arable crop farms, and (4) were published between 2000 and 2021. The data screening was done by two of three trained reviewers independently.

For our review, we only looked at studies that investigated behavioural factors, and are conceptually qualitative (i.e., using participant observations and open-ended interviews). Therefore, we only included studies that use open-ended questionnaires, interviews, or focus group discussions, as opposed to closed-ended survey questions. From the initially screened items in Schaub et al. (2023), 26 qualitative studies remained, from which we extracted information. These studies are not used in Schaub et al. (2023).

3.2. Data extraction and grouping of statements

For data extraction we clustered the respondents' statements in each research article into common themes using the methodology of a thematic analysis (Braun and Clarke 2012) and the TPB (Ajzen 1991). We identified three levels, ranging from the most general to the most specific: factors (attitudes, subjective norms, perceived behavioural control and trust), elements (sub-group), and themes. These statements are the general findings derived from interviews in the respective papers, but not the authors' interpretations. The statements describe the outcome beliefs (attitudes), the normative beliefs (subjective norms), control beliefs (perceived behavioural control) or the interpersonal and relational trust (Fig. 1). One article can contain multiple statements. The median number of statements per article is 10 and the interquartile range is at 8.25 statements. First, we clustered the statements into the factors of the TPB, and second, to gain a more in-depth understanding we categorized the statements in each factor into elements which seemed appropriate (Fig. 2). For attitude we built five elements: farmers' identity, legitimacy, non-financial outcome beliefs, financial outcome beliefs, and perceived risks. For subjective norms we clustered the statements into two elements: normative legitimacy and relationships. For perceived behavioural control we have four clusters: costs and practicality, farm functions, perceived uncertainties and skills and knowledge. For the trust component we grouped the statements as described above into institutional and relational trust. Third, we identified several themes in each element that more specifically describe the respondents' statements but still allow a grouping over the respective statements (Fig. 2).

3.3. Articles and data overview

The articles studied used either qualitative or mixed methods, i.e., a combination of qualitative interviews followed by quantitative surveys (Fig. A2). For our study, we used only information from the qualitative component. Schaub et al. (2023) provide an in-depth review of quantitative studies. Methodologically, qualitative approaches varied

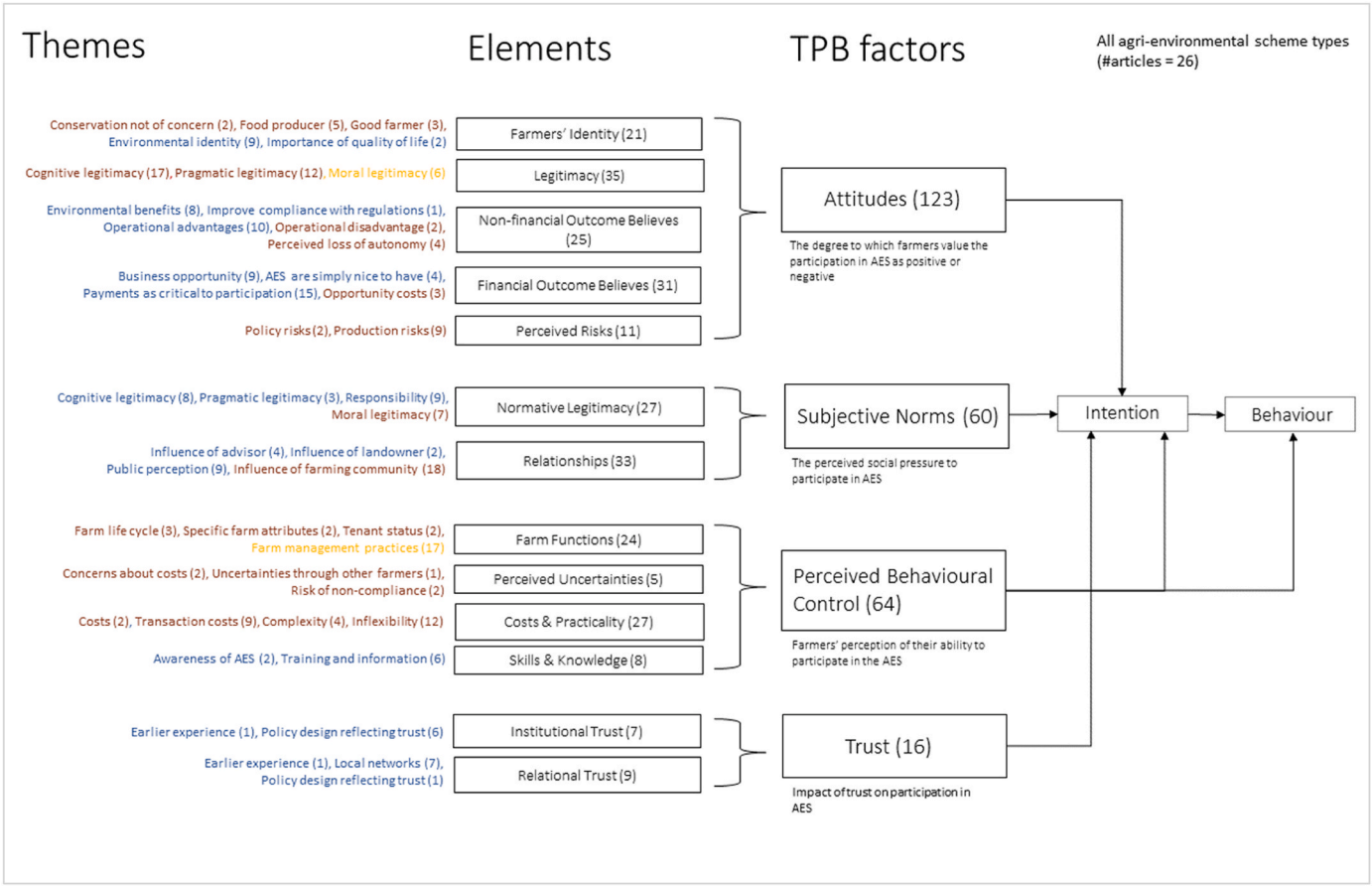

Fig. 2. TPB for the participation in agri-environmental schemes (adapted from Ajzen 1991)
Incorporation of farmers' statements towards their intention of participating in agri-environmental schemes into the Theory of Planed Behaviour (TPB).

between and within articles, sometimes using multiple methods instead of just one, such as in-depth interviews and focus group discussions. Most articles used semi-structured interviews and in-depth interviews, but researchers also conducted workshops or used alternate interviewing techniques, such as walking approaches, active interviews, and field discussions (Table A1). The use of a semi-structured interview approach was noted by several authors as a fruitful approach to ensure that important topics were covered, while also giving respondents space to express their thoughts in their personal words and capture farmers' logical reasoning (Van Herzele et al. 2013; Reimer and Prokopy 2014; De Vries et al. 2019). The opportunity for farmers to express themselves and to link to past experiences or simply recall memories was particularly encouraged by having family participate in the interviews (Ingram et al. 2013), having in-field discussions (Fish et al. 2003), or by using a walking interview approach (Riley et al. 2018).

The analytical concepts used to analyse behavioural factors for decision-making are almost as numerous as the articles studied. Half of the articles used a specific analytic concept (Table A1). These included, for example, the social constructionism perspective, which emphasizes the importance of culture, context, and collaboration in decision making (Amineh and Asl 2015); the adoption diffusion model (Rogers 1995), which describes the innovation decision process from awareness to adoption or rejection; or, as used in this study, the TPB. Other authors did not follow any specific analytical concept but described and discussed farmers' statements from their point of view (Table A1).

From the identified 26 articles, 17 focused on action-based, individual schemes, seven on collective schemes, and two articles on results-based, individual schemes. Most research was conducted in Europe (18) and the US (5). Two articles were conducted in Canada, one in Australia (Table A1).

We derived 263 statements from the 26 articles on factors that influence farmers' participation in agri-environmental schemes (Table 1). Of the 26 articles, only six stated factors for the extended TPB including Trust and 10 for all components of the original theory (Fig. A2). Most statements are attitudinal (47.2%), 23.4% belong to perceived behavioural control, 23.8 % to subjective norms and 5.6% to trust (Table 1).

4. Results

Across all agri-environmental scheme types, the most often stated factors influencing participation in agri-environmental schemes are attitudes (123 statements), followed by perceived behavioural control (64) and subjective norms (60), and lastly trust (16); (Table 1 and Table A1). The elements most often mentioned are legitimacy (factor: attitudes), financial outcome beliefs (factor: attitudes) and relationships (factor: subjective norms) (Fig. 2). In the following paragraphs we describe our findings for each element in the TPB and give examples of statements from respective articles. In a second step we describe behavioural factors for collective agri-environmental schemes and draw out the differences between individual (n = 19) and collective schemes (n = 7).

Table 1
Number of statements in each scheme type and total amount of statements.

Scheme type	Attitude	Perceived Behavioural Control	Subjective Norms	Trust	Grand Total
Action, individual	99	50	38	12	199
Results, individual	7	7	3	0	17
Collective	17	7	19	4	47
All schemes	**123**	**64**	**60**	**16**	**263**

4.1. Attitudes

Regarding attitudes, by reviewing the literature, we clustered the statements into five different elements: farmers' identity, legitimacy, non-financial outcome beliefs, financial outcome beliefs and perceived risks (Fig. 2).

4.1.1. Farmers' identity influences participation

Thirteen studies looked at the influence of farmers' identity towards participating in agri-environmental schemes, i.e., environmental identity, good farmer, food producer, importance of life quality, and conservation not of concern. Several statements regarding farmers' identity reflect outcome beliefs which are not conducive to participation in agri-environmental schemes.

Farmers seeing themselves as primary ***food producers*** (Ingram et al., 2013; Taylor and Van Grieken 2015) or as ***good farmers***, i.e., farming in a tidy and neat manner, have a more ambivalent and mainly negative attitude towards agri-environmental schemes (Fish et al. 2003; Burton et al. 2008; Ingram et al. 2013; Westerink et al. 2020). Farmers who self-identified as traditional farmers without a strong commercial focus tend to support the schemes because they help maintain their farms without resorting to intensification practices (Ingram et al. 2013). Two studies reported that farmers felt that conservation was not a concern for them due to a general anti-conservation feeling and were therefore not interested in or indifferent about participation in agri-environmental schemes (Macfarlane 2000; Van Herzele et al. 2013). Overall, the idea of being a 'good farmer', as perceived by the traditional farming community, seems to discourage participation in various European regions (England, Scotland, Germany, and the Netherlands) (Fish et al. 2003; Burton et al. 2008; Westerink et al. 2020).

Farmers who identified with environmental values (theme: ***environmental identity***) and who emphasized life quality tended to have a positive attitude towards agri-environmental schemes. Fish et al. (2003) found that an attachment to nature and wildlife or appeals to the historic and cultural values of the landscape positively influence farmers' attitudes towards agri-environmental schemes. Home et al. (2014) distinguished between "producers who conserve" and "conservationists who produce", but both groups had a positive attitude towards participating in the schemes. Additionally, farmers who sought to improve their ***quality of life*** by reducing their workload, particularly when their income was not solely reliant on agriculture (Karali et al. 2014), as well as older farmers (Lute et al. 2018), were more likely to have a positive attitude towards these schemes.

4.1.2. Legitimacy: farmers evaluate participation based on cognitive, pragmatic, and moral legitimacy

In evaluating the legitimacy of participating in agri-environmental schemes, individuals assess behaviour based on personal criteria. We examined three factors that contribute to this evaluation: ***cognitive legitimacy*** (whether the behaviour makes sense in general), ***pragmatic legitimacy*** (whether it makes sense for the individual) and ***moral legitimacy*** (whether it is the right thing to do). We found that most statements expressed a negative attitude towards participating in these schemes, particularly in terms of cognitive and pragmatic legitimacy. However, the results for moral legitimacy were mixed.

Most statements (17 out of 35) referred to ***cognitive legitimacy*** and were predominantly negative (11). These negative statements focused on the policymaking process, design, and expected outcome. Farmers believed that the policy process was only legitimate if it was participatory and conducted by individuals with knowledge of the local context (Del Corso et al. 2017). By contrast, farmers considered non-participatory policy processes as lacking legitimacy (Emery and Franks 2012; Chapman et al. 2019). Regulatory policy tools, such as prescriptive regulatory controls and mandatory risk management plans, were resented by farmers, as they believed these tools were applied universally and unfairly, resulting in punitive measures (Taylor and Van

Grieken 2015). Farmers also believed that agri-environmental schemes could hinder nature conservation by prescribing ineffective actions (Home et al. 2014). Moreover, in the case of subsidiary payments, farmers felt that the schemes rewarded those who are actually responsible for environmental degradation (Kolinjivadi et al. 2019). Furthermore, farmers' scepticism of the positive outcomes of agri-environmental schemes led to prejudices about the measures and influenced the decision to adopt them (Fish et al. 2003; Karali et al. 2014; Stupak et al. 2019).

Regarding ***pragmatic legitimation***, farmers' statements about participation were mostly negative. They believed that their extensive knowledge about their farms was crucial, but they felt that this knowledge was disregarded and not given much importance by the scheme design (Chapman et al. 2019). Additionally, the proposed rules and regulations were seen as not being aligned with the realities of their farms (Chapman et al. 2019). Due to their scepticism about the environmental benefits of agri-environmental schemes, farmers expressed reluctance to participate if they did not see evident benefits on their own farms, even if they had a desire to protect nature (Emery and Franks, 2012; Stupak et al., 2019). Morris et al. (2000) emphasized the importance of providing farmers with sufficient information to determine whether a system is suitable for their farms. They suggested that a trial to observe practical effects would have been helpful to farmers. This point relates to perceived behavioural control factors, discussed further below, as a lack of information and awareness hindered farmers' participation.

When making decisions about participating in agri-environmental schemes, farmers also consider the ***moral legitimacy*** of their actions. Conflicting values arose when certain rules or institutional structures, such as dependence on government, did not align with their moral beliefs (Chapman et al., 2019). Del Corso et al. (2017) found that farmers might reconsider their expertise and integrate new moral commitments when they are convinced that alternative practices are feasible and efficient in terms of environmental performance. This links pragmatic and cognitive legitimacy to moral legitimacy. Additionally, farmers perceived the schemes to be unfair in terms of the competitive application process, as those who had already invested in environmentally friendly practices in the past did not benefit (Taylor and Van Grieken 2015).

4.1.3. Non-financial outcome beliefs influence participation

We found five overarching themes related to non-financial outcomes. Three of these, namely environmental benefits, compliance improvement, and operational advantages, were evaluated as having a favourable influence on attitudes toward participation. Farmers also mentioned that operational disadvantages and the loss of autonomy had a negative impact on participation. Environmental benefits and operational advantages were most frequently mentioned – eight and ten statements respectively.

Regarding ***environmental benefits***, the most often mentioned positive outcome belief was an increase in biodiversity (Morris et al. 2000; Wilson and Hart 2000; Van Herzele et al. 2013; Lute et al. 2018; Wezel et al. 2018; Kolinjivadi et al. 2019; Ouellet et al. 2020; Del Rossi et al. 2021), followed by conservation of natural resources (Wilson and Hart, 2000; Lute et al., 2018). Nevertheless, Lute et al., 2018 found that farmers would prioritize short-term financial gains over conservation.

Operational advantages refers to the benefits of improving farm management practices through agri-environmental schemes, which in turn improve farmers' attitudes towards participating in these programs (Chapman et al. 2019). In schemes focused on improving nutrient management and soil health, farmers were generally more willing to participate, as they saw potential benefits in terms of improving yields (Van Herzele et al. 2013; Reimer and Prokopy 2014; Lute et al. 2018; Kolinjivadi et al. 2019; Stupak et al. 2019). Some farmers used these schemes as an opportunity to reduce their farming activities (Kolinjivadi et al. 2019).

Van Herzele et al. (2013) also found that ***anticipating future regulations and improving compliance*** was a positive outcome belief of participation for some farmers. By contrast, it has been argued that farmers believe they will lose their ***autonomy*** by participating in agri-environmental programs. Farmers saw the schemes as intrusive (Morris et al. 2000; Karali et al. 2014), and as leading to a loss of their agency over their own land (Chapman et al. 2019). In a collective scheme context, farmers were also worried about being dependent on the actions of other farmers (Riley et al. 2018).

While the articles often cited operational benefits, they also mentioned ***operational disadvantages***. In particular, the increase of weeds, predators or undesirable species was a major concern for farmers (Emery and Franks 2012).

4.1.4. Variety in financial outcome beliefs regarding agri-environmental schemes

In addition to non-financial outcome beliefs, some farmers valued the payments they received as being a ***'nice-to-have addition'*** rather than a primary motivator for their agricultural practices (Van Herzele et al. 2013; Reimer and Prokopy 2014). Other farmers believed in the ***business opportunity*** of the schemes, whether it is the opportunity to earn money for already existing practices (Van Herzele et al. 2013) from unproductive land (Home et al. 2014), or as a catalyser for participation (Fish et al. 2003). Agri-environmental schemes were also seen to be an opportunity to secure income in the context of the declining financial performance of conventional farming (Morris et al. 2000), and to create value in shorter supply chains by marketing the produce as environmentally friendly (Ouellet et al. 2020).

Nevertheless, for many farmers, the attitude towards participation was that ***payments were critical***. In Switzerland, conservation-oriented farmers (Home et al. 2014) or organic farmers (Karali et al. 2014) indicated that they would stop participating if payments decreased, and yet also mentioned that they were dependent on these payments. Farmers perceived the payments to be the main benefit of participation in Canada and the USA (Lute et al. 2018; Kolinjivadi et al. 2019; Del Rossi et al. 2021), as well as in the EU (Wilson and Hart 2000; Fish et al. 2003; Van Herzele et al. 2013; Russi et al. 2016; Wezel et al. 2018).

Anticipated **opportunity costs** are a barrier to participation for intensive farms (Russi et al. 2016). In the case of the outcome-based schemes in Baden-Württemberg, payments only covered the opportunity costs of less productive farmers (e.g., hay producers, part-time farmers), partly due to distorting incentives, especially incentives to produce biogas (Russi et al. 2016). Farmers indicated that agri-environmental schemes impose opportunity costs on them in the form of high implementation costs and loss of income (Karali et al. 2014; Russi et al. 2016; Wezel et al. 2018).

To summarize, in all regions we studied, farmers identified payments as the main benefit, and did not consider compensation or cost-sharing to be sufficiently high (Morris et al. 2000; Wilson and Hart 2000; Taylor and Van Grieken 2015; Del Rossi et al. 2021).

4.1.5. Higher perceived outcome risk is associated with a negative attitude

A higher level of perceived risk over the scheme outcome (e.g., increase of biodiversity and income) is likely to lead to a less positive attitude because it represents the expectation of a possible loss. Perceived risk - i.e., the possibility of loss or danger - is thus very likely to negatively influence attitudes towards a behaviour (Quintal et al. 2010). We grouped the stated risk factors into ***policy risks*** and production risks. On the former, two studies from Switzerland point out that farmers considered that reliance on governmental support to be risky, since policies can change, even from one year to the next (Home et al. 2014; Karali et al. 2014).

Regarding ***production risks***, farmers were concerned about a potential loss of yield, e.g., due to weed infestations Home et al. (2014); Taylor and Van Grieken (2015); Wezel et al. (2018); Kolinjivadi et al. (2019) stressed the risk of non-compliance with downstream actors, e.g.,

compliance with production contracts with the processing industry which push for high yields. Moreover, farmers did not want to take the risk of changing the business strategy (Macfarlane 2000) which they felt would disrupt economic cooperation with other local farmers and suppliers (Taylor and Van Grieken 2015). Farmers did, however, view agri-environmental schemes as an insurance policy for long-term productivity of soils (Kolinjivadi et al. 2019), and a way of reducing economic risks due to annual payments (Ingram et al. 2013).

4.1.6. *Collective schemes prioritize legitimacy elements*

Farmers in collective agri-environmental schemes prioritised legitimacy elements (Fig. A2), with positive evaluations of participation based on cognitive and moral legitimacy (e.g., Del Corso et al. 2017). This stands in contrast to individual agri-environmental schemes where such types of legitimacy were negatively linked to participation (see Fig. 2). Del Corso et al. (2017) suggest that participation in collective schemes led to a positive shift in moral legitimacy as farmers incorporated new moral norms into their professional expertise, when convinced of the environmental and technical feasibility of the collective scheme. In terms of pragmatic legitimacy, in the same study in England, farmers felt that the lack of demonstrable environmental benefits was a barrier to participation. In the Netherlands, the acceptance of collective schemes arose from the increasing external demand from food chain companies for sustainable products (Westerink et al. 2020). Moreover, farmers find collective schemes more efficient in achieving environmental benefits, as they harness synergies between farms and require less farmland to be taken out of production (McKenzie et al. 2013).

4.2. *Subjective norms*

The second factor of the Theory of Planned Behaviour is subjective norms, for which we grouped our findings into two elements: normative legitimacy and relationships.

4.2.1. *Normative legitimacy plays vital role in participation*

In analysing normative legitimacy, we also used the three aspects of legitimacy mentioned above, namely: cognitive, pragmatic, and moral legitimacy. ***Cognitive normative legitimacy*** refers to a community's judgment of whether a particular behaviour is meaningful. Karali et al. (2014) state that farmers prioritize complying with values from their family and the farming community. It was easier for farmers to decide on what constitutes sustainable practices, and to act on them, when they belong to a like-minded group (Ouellet et al. 2020). Our results show that a normative cognitive legitimacy towards agri-environmental schemes was mainly positive. Nevertheless, some farmers emphasized that local community knowledge was overridden by the agri-environmental schemes (Chapman et al. 2019).

In terms of **normative *pragmatic legitimacy*** ('does it makes sense for me'), Karali et al. (2014) speak of the need of farmers to be responsive to customer preferences (e.g., preference for sustainable products), which makes participation in agri-environmental schemes more meaningful. In collective agri-environmental schemes, farmers see the learning experience through collaboration with other farmers as a strong motivation to join (Westerink et al. 2020). However, if other farmers in the region are not interested in cooperation, participation in the program may not be meaningful or even possible for the individual farmer (Macfarlane 2000), which is also closely related to perceived behavioural control (see below).

When considering statements of **normative *moral legitimacy***, the effect on participation is positive (Fig. 2), depending on the community context, and is guided by a sense of responsibility towards future generations and the environment. Current social norms in a community can be encouraging (Kolinjivadi et al. 2019; Westerink et al. 2020), but seem to be mainly negative: e.g., programs are at odds with farmers' values of clean landscapes (Chapman et al. 2019), traditional farming practices (Lute et al. 2018), and even, interestingly, a general social undesirability or inability to adopt different farming practices to other farmers in the region (Taylor and Van Grieken 2015). Doubts about the positive environmental outcome of agri-environmental schemes also, leads to a negative opinion towards other farmers who participate in schemes (Stupak et al. 2019). Nevertheless, farmers mentioned a strong sense of moral responsibility towards future generations regarding food production, and inheritance of the farming business (Ingram et al. 2013; Home et al. 2014; Stupak et al. 2019). Farmers also emphasized their status as stewards of the natural environment and their moral responsibility to preserve it (Fish et al. 2003; Wezel et al. 2018; Chapman et al. 2019; Kolinjivadi et al. 2019).

4.2.2. *Varying impacts of relationships on participation*

Twelve of 20 articles that discussed subjective norms focused on the impact of relationships on decision-making. We categorized these relationships into four groups, namely advisors, landowners, the public, and the farming community. All these relationships, except for the farming community, had a positive influence on participation (Fig. 2), while the ***farming community*** often exerts negative peer pressure on farmers. Some studies highlighted that farmers may face peer pressure not to implement certain practices (Home et al. 2014), or there might be a reluctance to rely on other farmers (McKenzie et al. 2013), or an undesired social pressure to help others (Riley et al. 2018). There are, however, also positive pressures within the farming community that can encourage farmers to join agri-environmental schemes (Wilson and Hart 2000). Similar agri-environmental challenges shared by neighbouring farmers can motivate farmers to participate in local schemes, even when these farmers do not know each other personally (Ouellet et al. 2020). Improving the ***public perception*** of farming was important to many farmers, and was given as a reason to join agri-environmental schemes (Morris et al. 2000; Wilson and Hart 2000; Van Herzele et al. 2013; Wezel et al. 2018). It was also noted that agri-environmental schemes act as an educational tool to convey the importance of the role of farmers in society (Fish et al. 2003; Van Herzele et al. 2013).

4.2.3. *Subjective norms in collective agri-environmental schemes, importance of collaboration*

In articles investigating collective schemes, subjective norms are the most frequently mentioned factor (19 out of 47 statements). Of these, 11 statements referred specifically to the relationships between farmers (which is not surprising given that collaboration and relationships are crucial for collective schemes). However, most statements (8 out of 11) on the influence of the farming community on participation were negative. Emery and Franks (2012) found that collaboration with other farmers was perceived as being risky, and a perception that other farmers were less positive about agri-environmental schemes also negatively influenced participation. There can also be a mismatch between farmer-to-farmer relations, landscape, and timing, where existing relations may not align with landscape patterns and temporal needs (e.g., timing of specific farming activities) (Riley et al. 2018). Specifically, collective agri-environmental schemes are more likely to succeed if the participating farmers' practices are complementary (Riley et al. 2018). There are positive examples in terms of normative legitimacy (Fig. A2). Group discussions were also considered crucial, and serve as a prerequisite for cognitive legitimacy (Del Corso et al. 2017). The importance of peer learning, and having positive examples, increases farmers' willingness to participate (pragmatic legitimacy) (Macfarlane 2000; Westerink et al. 2020). This emphasizes the need to incorporate sustainability into the community's perception of a "good farmer" for moral legitimacy. Some farmers do, however, express concerns about relying on others, especially when negative experiences in the past have eroded their trust in the community (Riley et al. 2018; and below for further discussion on Trust).

4.3. Perceived behavioural control

Ajzen (1985) introduced the concept of perceived behavioural control in addition to attitudes towards behaviour and social norms as factors influencing the intention to act. Perceived behavioural control moderates intention, meaning that the belief of having control over behaviour affects its actual execution.

Our findings indicate that most of the statements related to perceived behavioural control were negatively worded, for example "too much paperwork" (45 out of 63 statements), which may hinder the participation in agri-environmental schemes. We categorized these into four groups: costs and practicability, farm functions, perceived uncertainties, and skills and knowledge (Fig. 2).

4.3.1. Cost, complexity, and inflexibility impact scheme participation

Cost and practicality were most frequently mentioned in the reviewed literature for perceived behaviour control (27 statements). We consider two elements of cost, the first relating to monetary reasons that prevent participation, and the second to transaction costs. ***Transaction costs*** incurred by farmers due to participation in the scheme included time spent on applications, paperwork, and calculations (Splinter and Dries 2023). Perceived transaction costs (Fig. 2) included bureaucracy and substantial paperwork, which were noted by almost all studies that considered transaction costs, and even noted as the principal barrier to participation (Del Rossi et al. 2021). Regarding ***direct monetary costs***, farmers expressed concern about their financial ability to participate in the scheme (Fish et al. 2003), especially in schemes that do not use economic incentives (Westerink et al. 2020).

The ***complexity*** of the application process and the introduction and maintenance of measures were highlighted as major concerns by farmers. Chapman et al. (2019) reported that farmers found the application procedure for agri-environmental schemes to be too complicated and overwhelming. Similarly, Morris et al., 2000 found that farmers perceived the introduction and maintenance of the measures to be challenging. In fact, Ouellet et al. (2020) argued that farmers in Canada valued the simplicity of their specific scheme contract.

The ***inflexibility*** of the schemes was frequently mentioned as a barrier to farmers' intention to participate in agri-environmental schemes (12 statements). Many articles stated that the regulations are too strict and lack flexibility, for example, in terms of timing, management flexibility and contract duration, and that there are too many rules to follow (Morris et al. 2000; Home et al. 2014; Karali et al. 2014; Lute et al. 2018; Chapman et al. 2019; Chapman et al. 2019 argued that overly strict rules are associated with a value conflict arising from increased dependence on the government and loss of control over one's land, which is related to beliefs about outcomes (see section Attitudes, loss of autonomy). Two articles found that farmers feel less constrained in result-based schemes, saying the measures provide more flexibility (Russi et al. 2016; Wezel et al. 2018).

4.3.2. Farm characteristics and past choices influence agri-environmental scheme participation

Farmers identified several factors related to the current functioning of their farm that acted as a perceived behavioural control to their participation in agri-environmental schemes. These included farm management practices, specific farm attributes, tenant status, and the current stage of the farm life cycle (Fig. 2; Element: farm functions).

Several studies examined the influence of ***farm management practices*** on perceived behavioural control, with mixed findings. While eight statements were found relating to farm management practices, half of the articles found that the farmers' current practices did not fit with the requirements of agri-environmental schemes, making participation difficult. As participation would require a significant shift in management, which was perceived as incompatible with the farmers' current farming system (Morris et al. 2000; Wilson and Hart 2000; Home et al. 2014; Taylor and Van Grieken 2015). Other barriers were off-farm work, which left farmers with insufficient time and labour (Karali et al. 2014), and a lack of necessary equipment (Taylor and Van Grieken 2015). On the other hand, for some farmers the agri-environmental scheme was compatible with their farm functions, and participation was easy, especially for low-intensity farms (Wilson and Hart 2000; Fish et al. 2003; Ingram et al. 2013; Van Herzele et al. 2013; Karali et al. 2014). According to Ingram et al. (2013), agri-environmental schemes served as a survival strategy and helped increase resilience for these farms. Depending on the scheme options, farmers chose the measures that best suited their farm or even improved their functions (Van Herzele et al. 2013). Karali et al. (2014) found that farmers perceived ***specific farm attributes*** as inhibiting their participation, i.e., soil quality does not fit the program, or the farm size does not match. Also, ***tenant agreements*** were mentioned as a perceived hurdle for participation due to high costs, insecurity of tenant status, and little decision-making possibilities on tenanted lands (Fish et al. 2003; Karali et al. 2014).

Ingram et al. (2013) and Karali et al. (2014) examined the influence of the ***farm life cycle*** on farmers' opportunities and decision-making related to participating in agri-environmental schemes. These studies found that decisions made in the past may limit the ability of farmers to participate in current programs. Furthermore, farmers who are close to retirement or do not have a successor might be less willing to make changes and participate in agri-environmental schemes.

4.3.3. Perceived uncertainty influences farmers decision making

We explored farmers' perceived uncertainty about their ability to act and its impact on their perceived behavioural control. Unlike risk, uncertainty is subjective and varies from farmer to farmer (Becker and Knudsen 2005), and is likely to have a negative impact on farmers' perceived behavioural control. Farmers' ***concerns about costs***, ***other farmers,*** and the ***possibility of non-compliance*** in results-based schemes were mentioned in the reviewed articles. Farmers expressed their concerns about the possibility of higher workload (transaction cost) and an uncertainty of the financial implications of the scheme. However, in Del Corso et al. (2017), farmers decided to join the scheme after being reassured about its financial viability. In collective agri-environmental schemes, uncertainties arose from the behaviour of other farmers, especially if they decided to change management practices or to leave the scheme (Emery and Franks 2012). In results-based schemes, external factors beyond farmers' control, such as weather or wild boar damage, increase uncertainties on their ability to achieve the contracted outcomes (Wezel et al. 2018). In the results-based scheme in Baden-Württemberg (MEKA-B4), external factors and the possibility of non-compliance were not considered to be impediments to achieving outcomes (Russi et al. 2016). The interviewed farmers had confidence in their ability to deliver the required results by using the correct measures, such as maintaining extensive pasture management.

4.3.4. Skills and knowledge influence perceived behaviour control

Skills and knowledge had relevance to farmers perceived behavioural control, and most articles identified a perceived deficiency in skills and knowledge. In terms of ***training and information***, for example, Ouellet et al. (2020) emphasized the positive impact of guidance and knowledge building through the programme. It was often mentioned that there is a lack of understanding of the functioning of agri-environmental schemes and that training, i.e., technical or staff support, is needed (Home et al. 2014; Taylor and Van Grieken 2015; Wezel et al. 2018; Chapman et al. 2019). Additionally, there is a lack of **awareness about agri-environmental schemes**, which could hinder participation (Wilson and Hart 2000; Reimer and Prokopy 2014; Palm-Forster et al. 2016).

4.3.5. Diverse views on perceived behavioural control in collective agri-environmental schemes

Flexibility was deemed to be particularly important in collective schemes, with farmers perceiving collective schemes as being less

restrictive than individual schemes, and more sensitive to local conditions (McKenzie et al. 2013). Emery and Franks (2012) highlighted the need for more flexibility in collective schemes due to the negative impacts of transaction costs, especially bureaucracy. Regarding direct costs of the schemes, in the Netherlands' Skylark Foundation collective system, farmers expressed that economic incentives were not used due to the market-based nature of the foundation, leading to a preference for certain measures over others (e.g., soil health measures were more favourable than above ground biodiversity) (Westerink et al. 2020). Farmers also expressed uncertainty about the economic viability of the systems, but once reassured they decided to join the scheme (Del Corso et al. 2017). Farmers might also feel insecure about joining a collective scheme as other farmers might opt out, highlighting issues of trust (Emery and Franks 2012). Additionally, farmers in the same study felt that neighbours managed their farms very differently or had contrasting farming systems, making collaboration difficult or not fruitful.

4.4. Trust

While trust is increasingly recognized as a crucial factor in agri-environmental policies (Ostrom 2010; De Vries et al. 2019), it was the least discussed factor among the reviewed articles. Out of the 26 articles, only nine included elements of trust. Trust can accelerate the learning process and reduce uncertainty, as evidenced in collective systems in France and the Netherlands (Del Corso et al. 2017; De Vries et al. 2019).

Del Corso et al. (2017) argued that by delegating tasks and reducing bureaucracy, governments can foster relational trust, which, in turn, strengthens trust in the institution and scheme design.

4.4.1. Institutional trust fosters participation

Trust of farmers in the agri-environmental institutional framework is important for increasing participation. Farmers indicated in several studies that agri-environmental ***policy design needs to reflect trust*** for them to participate. Studies have found that farmers distrust the government and question its motives and expertise, which leads to a distrust of the scheme itself (Sutherland et al. 2013; Ouellet et al. 2020). This distrust arises from *earlier negative experiences* with the governing institutions (Taylor and Van Grieken 2015), or frequently changing legislation (Karali et al. 2014) and can form strong path dependencies based on these past negative experiences.

4.4.2. Relational trust vital for participation

Local networks play a crucial role in building trust in agri-environmental programs. Farmers value relational trust with conservation staff, other farmers, and customers (Karali et al. 2014). Trust in conservation staff is important, and farmers want to feel that their concerns and suggestions are heard (Del Rossi et al. 2021). Local consultation and support networks are also crucial for building trust, especially at the beginning of the program when concerns are high (Karali et al. 2014; Chapman et al. 2019). Ouellet et al. (2020) point to the importance of a farmer-to-farmer approach that can help establish a mutual basis of trust and encourage participation. Farmers also consider it important that their customers trust them, and they believe that participating in agri-environmental programs can improve this relational trust (Karali et al. 2014).

The ***agri-environmental policy design*** itself needs to reflect trust in addition to building local trust networks. Sutherland et al. (2013) found that farmers distrusted extension workers because they were worried that on-farm problems would be reported to regulators. The ***legacy effect of past experiences*** on trust with either the government or between farmers has been raised. For instance, previous experiences in the farming community can undermine trust, underlining the importance of being time and place sensitive, i.e., success in one area cannot be taken as evidence of functioning in another (Riley et al. 2018).

4.4.3. Collective schemes nurture trust, learning, and behavioural change

In collective schemes, ***institutional and relational trust*** are considered very important and accelerated the learning and change process (Del Corso et al. 2017). Yet, the institutional design of collective schemes itself also enhanced trust by supporting a bottom-up approach by reducing the workload and uncertainties (De Vries et al. 2019). De Vries et al. (2019) found that collective schemes promoted more interactions between farmers and other stakeholders, such as opportunities to share experiences, expand opportunities, and discuss uncertainties. This also led to a decreased direct interaction with the government, which was seen as positive. However, past negative events can impact trust in a community, and success in one community does not guarantee immediate results in another (Riley et al. 2018).

5. Discussion and policy relevance

This study shows that a variety of behavioural factors positively and negatively influence farmers' decision to participate in agri-environmental schemes, and that there are interactions among these factors. We first highlight these interactions, and then discuss our findings along individual schemes and collective schemes and stress the policy relevance of our findings.

Our results show that the interconnections between the elements of the TPB, legitimacy and trust are multifaceted. We see that perceived behavioural control is related to pragmatic legitimacy ('does it make sense for me'), as sufficient information and practical insights positively impacted farmers attitude about the scheme outcome (e.g. in Morris et al., 2000; Stupak et al., 2019). Lack of flexibility (perceived behavioural control) influences attitudes about losing autonomy and can negatively affect participation (Chapman et al., 2019), indicating a lack of institutional trust. This lack of trust in government can likewise impact the perceived legitimacy of policies. Trust has emerged as a pivotal aspect of our analysis. The relationship between trust and subjective norms became evident, particularly in the context of collective schemes, where the influence of the farming community is a critical factor for participation. Trust in other farmers and institutions is essential, and negative experiences can notably hinder participation.

Individual schemes

Focussing on individual schemes, attitudinal factors are studied most prominently. These are diverse in their influence on participation and are intertwined. Statements about legitimacy were most frequently mentioned. The low rating of cognitive legitimacy, particularly in relation to the policymaking process, design, and expected scheme outcome, had a negative impact on participation. Farmer's identity might also be linked to cognitive legitimacy: specifically, a positive environmental identity was associated with greater participation, whereas identifying primarily as "food producers" or "good farmers" was associated with a negative attitude towards participation. Therefore, addressing the issue of cognitive legitimacy is crucial in promoting greater participation in such schemes, and understanding the social or professional role and identity of individuals is crucial for understanding their behaviour (Michie et al. 2014).

The extent to which farmers are affected by perceived opportunity costs might be linked to their identity as food producers or their preference for traditional production systems, especially as their perceptions of the desired outcomes are closely connected to their personal beliefs and values (see e.g., Karali et al. 2014; Schaub et al. 2023). Regarding other elements of perceived behavioural control, our findings indicate that the current farm functioning, including elements of costs and practicality, inhibit participation. Farmers stressed the negative implications of contract complexity and inflexibility on their ability to participate in agri-environmental schemes. Moreover, farmers expressed a low level of trust in the policymaking process. A distrust of government also affects the perceived legitimacy of policies, as farmers feel that

policymakers do not understand the agricultural context (Sutherland et al. 2013; Chapman et al. 2019).

The main policy implication for individual schemes relates to attitudes and institutional trust. Our suggestion to policymakers is to work towards transforming existing attitudes towards participation and to continue to enhance farmers' trust in institutions, especially by involving local institutions (Kettl 2019). It is evident that increasing institutional trust can have a direct impact on the perceived legitimacy of policies, leading to a positive shift in farmers' attitudes towards agri-environmental schemes. To improve institutional trust, it would be helpful to establish clear frameworks and guidelines that highlight the benefits of participating in agri-environmental schemes. This could involve creating transparent and accessible processes for participation, monitoring, and evaluation, as well as feedback mechanisms.

Collective schemes

Subjective norms and the influence of the farming peer community were most related to farmers' participation in collective schemes. The importance of relationships within the farming community in collective systems is underlined by the negative subjective norms that farmers often experience, leading to social pressure not to participate. These results imply a negative view of agri-environmental schemes in the respective farming communities.

Moreover, trust is important for participation. Negative experiences with other farmers or institutions undermines trust, and recovering trust is time-consuming and can be hindered by past uncooperative behaviour (e.g., free riding). Trust and subjective norms are interlinked: a lack of interpersonal trust can erode the social capital in a community (Riley et al., 2018). Collective systems, if farmers choose to participate, can build social capital and trust through opportunities to share experiences, expand possibilities, and discuss uncertainties (Macfarlane 2000; Del Corso et al. 2017; Westerink et al. 2020).

As for individual schemes, farmers mentioned the need for more flexibility in collective schemes and a reduction of bureaucracy (Emery and Franks 2012). Moreover, elements of uncertainty were associated with economic viability as well as uncertainties caused by collaborating with other farmers (Emery and Franks 2012; Del Corso et al. 2017). Yet collaboration can enhance normative cognitive legitimacy, improving individual legitimacy of the agri-environmental scheme (Del Corso et al. 2017).

Hence, the main policy implication for collective schemes, is to foster interpersonal and institutional trust and overcome barriers caused by subjective norms. For instance, community-based approaches could encourage participation and collaboration by improving legitimacy and building trust between farmers. This might involve creating forums for farmers to discuss their experiences, share knowledge, and promote community-building initiatives. Targeted interventions that focus on specific groups or communities can help address the unique challenges and barriers faced by different farmers. For instance, interventions that focus on social inclusion, knowledge creation, and access to resources can promote positive subjective norms and build trust to improve participation rates.

Limitations and further research

This study has two principal shortcomings. Firstly, we included studies from different regions, each operating in a different context. Qualitative research, as well as agri-environmental policy can be highly context-specific, and while useful for a particular implementation setting, extrapolation is not always possible. Secondly, we lacked access to the original source statements and had to synthesize information from published articles, potentially resulting in incomplete data. There is a possibility that some nuance was lost from our analysis as a result.

For future research we recommend that researchers focus on understanding the entire decision-making process, including past collaboration experiences in agri-environmental schemes and subjective norms. Specifically, we suggest going beyond the notion of a single decision-maker and considering the influence of the social environment, particularly the family decision-making process. Despite quantitative literature highlighting the influence of family (Schroeder 2015), we did not find evidence of this in our review.

By viewing a farm as an evolving entity, research can better understand whether agri-environmental schemes are better suited to farms at different stages of their development. This means that farmers' perceptions of these schemes may change depending on external circumstances and the control they have over them. Qualitative research can uncover aspects of decision making that would otherwise remain unexplored. Thus, future research should strive to integrate qualitative and quantitative research approaches for the ex-ante and ex-post assessment of policies toward agri-environmental schemes (e.g., El Benni et al. 2023).

6. Conclusion

This article examines how behavioural factors such as attitudes, subjective norms, perceived behavioural control, and trust influence farmers' intentions to participate in agri-environmental schemes. We synthesize information from 26 qualitative studies and compare individual and collective scheme types using the expanded Theory of Planned Behaviour. Our study contributes to understanding the behavioural factors that affect farmers' decision-making, which is particularly important for the push towards more environmentally ambitious schemes, including collective schemes.

Our study emphasizes several important insights for policy. First, to improve participation in agri-environmental schemes, policy makers can foster social capital by viewing farm businesses as part of a community context, rather than as single entities, specifically for collective but also individual schemes. Social learning is crucial to improve skills and knowledge, as well as re-evaluating perspectives and building trust within the community, showing the interconnections between social norms and relational trust. In collaborative settings there is a complex negotiation process between farmers on whether to collaborate and participate jointly. It is important to recognize that multiple and interconnected variables influence decision-making at every stage of the collaboration process. Collaboration is not a static decision, and it can evolve over time (Ostrom 2010). Qualitative research can be useful for understanding the evolution of relationships and collaborations between farmers, allowing participants to share their stories and for researchers to comprehend them.

Second, this also holds for individual schemes, policymakers should prioritize shifting farmers' attitudes and building institutional trust. Studies indicate that farmers require trust in agri-environmental policy design to participate. Negative experiences with governing institutions and frequently changing legislation have resulted in a lack of trust in the government and the scheme itself. Thus, clear regulatory frameworks and guidelines must be established, along with transparent and accessible processes for participation, monitoring, evaluation, and feedback mechanisms.

Third, flexibility, such as introducing opt-out options, could increase scheme participation to strengthen farmers' perceived ability to participate in agri-environmental schemes. However, increasing flexibility can impair the effectiveness of improving the environmental state, representing an important trade-off. Moreover, when increasing flexibility policymakers should be mindful of potential increased complexity and transaction costs.

Finally, synthesizing qualitative information using the TPB framework can enhance integration of behavioural factors in policymaking. There is opportunity for qualitative studies to provide a finer understanding of the different factors of decision making. Policymakers can tailor their strategies to better align with the needs and expectations of farmers and stakeholders, ultimately enhancing the success of agri-

environmental schemes and their impact on the environment.

Declaration of interests

We have acknowledged the projects and agencies we have worked with. We believe that there are no conflicts of interest.

CRediT authorship contribution statement

Adelaide Sander: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **Jaboury Ghazoul:** Funding acquisition, Methodology, Project administration, Resources, Supervision, Writing – review & editing. **Robert Finger:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Sergei Schaub:** Conceptualization, Data curation, Investigation, Methodology, Supervision, Validation, Writing – review & editing.

Data availability

Data will be made available on request.

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Appendix

Table A1
Article Overview

	Analytical concepts and methods used	Country	Scheme name	Scheme Type	Attitude	Perceived Behavioural Control	Subjective Norms	Trust
# Articles					26	21	22	9
Taylor and Van Grieken 2015	Social constructionism perspective; focus group (24 farmers)	Australia	Reef rescue program	Action, individual	Yes	Yes	Yes	Yes
Wilson and Hart 2000	Mixed method; Survey and in-depth interviews (5–10 per country)	Austria, Denmark, France, Germany, Greece, Portugal, Spain, Sweden, Switzerland, UK	Several depending on country and region	Action, individual	Yes	Yes	Yes	
Van Herzele et al., 2013	Mixed method; 43 semi-structed interviews and quantitative survey	Belgium	Several schemes	Action, individual	Yes	Yes	Yes	
Kolinjivadi et al., 2019	Agrarian systems approach; 60 semi-structured open interviews	Canada	Alternative Land Use Services	Action, individual	Yes		Yes	
Ouellet et al., 2020	Interactionist proximity analysis; 45 semi-structured interviews	Canada	Alternative Land Use Services	Action, individual	Yes	Yes	Yes	Yes
Fish et al., 2003	100 semi-structured interviews and in-field discussions	England	Environmentally Sensitive Area and Countryside Stewardship	Action, individual	Yes	Yes	Yes	
Morris et al., 2000	Adoption diffusion model; 20 exploratory interviews and 200 interviews open/and closed questions	England	Country Stewardship	Action, individual	Yes	Yes	Yes	
Sutherland et al., 2013	Conceptualizing Trust; 48 interviews	England	Several schemes	Action, individual				Yes
Emery and Franks 2012	33 semi-structured interviews, principle of active interviewing	England	Environmental Stewardship	Collective	Yes	Yes	Yes	
McKenzie et al., 2013	32 interviews	England	Environmental Stewardship	Collective	Yes	Yes		
Del Corso et al., 2017	Discourse and textual analysis; 38 semi-structured interviews and follow up quan. Questionnaire	France	AES on the European Water Framework Directive	Collective	Yes	Yes	Yes	Yes
Stupak et al., 2019	Reasoned action model; 25 in-depth open-ended interviews	Germany	Several schemes	Action, individual	Yes		Yes	
Russi et al., 2016	24 interviews, closed and open-ended questions	Germany	MEKA-B4 program in Baden-Württemberg	Results, individual	Yes	Yes		
Wezel et al., 2018	79 interviews, closed and open-ended questions	Germany, France, Austria, Italy, Switzerland	Several schemes depending on country	Results, individual	Yes	Yes	Yes	
Burton et al., 2008	Embodied cultural capital, 25 open interviews	Germany, Scotland	Hessische Landschafts-pflege program, Rural Stewardship Programme	Action, individual	Yes			
Home et al., 2014	TPB; 15 semi-structured interviews	Switzerland	Ecological Compensation Areas	Action, individual	Yes	Yes	Yes	
Karali et al., 2014	Grounded theory; 24 interviews	Switzerland	Diverse schemes and organic farming	Action, individual	Yes	Yes	Yes	Yes

(*continued on next page*)

Table A1 (*continued*)

	Analytical concepts and methods used	Country	Scheme name	Scheme Type	Attitude	Perceived Behavioural Control	Subjective Norms	Trust
De Vries et al., 2019	Collective action and Trust; 16 semi-structured interviews	The Netherlands	Cooperative Agricultural Nature Drenthe	Collective				Yes
Westerink et al., 2020	Decision making influenced by factors of motivation, ability, demand and legitimation (Runhaar et al., 2017); 2 in-depth interviews with farmers, several interviews with coordinators, group interviews and workshops.	The Netherlands	Skylark Foundation	Collective	Yes	Yes	Yes	
Riley et al., 2018	74 interviews, walking approach; 5 study sides	United Kingdom	No specific information given	Collective	Yes		Yes	Yes
Chapman et al., 2019	Concept of relational values ((Chan et al., 2016); 22 open-ended interviews	USA	Conservation Reserve Enhancement Program (CREP)	Action, individual	Yes	Yes	Yes	Yes
Del Rossi et al., 2021	19 semi-structured interviews with farmers and employees/experts	USA	Environmental Quality Incentives Program and CREP	Action, individual	Yes	Yes	Yes	Yes
Lute et al., 2018	8 focus groups (29 farmers, 8–9 in each group), consecutive quan. survey with landowners	USA	Conservation Reserve Program	Action, individual	Yes	Yes	Yes	
Reimer and Prokopy 2014	20 semi-structured interviews and follow-up quan. survey	USA	Conservation Reserve Program	Action, individual	Yes	Yes		
Macfarlane 2000	46 interviews	USA	Lake District Environmental Sensitive Area payments	Collective	Yes		Yes	
Ingram et al., 2013	36 narrative style, semi-structured face to face interviews	Wales	Tir Gofal	Action, individual	Yes	Yes	Yes	

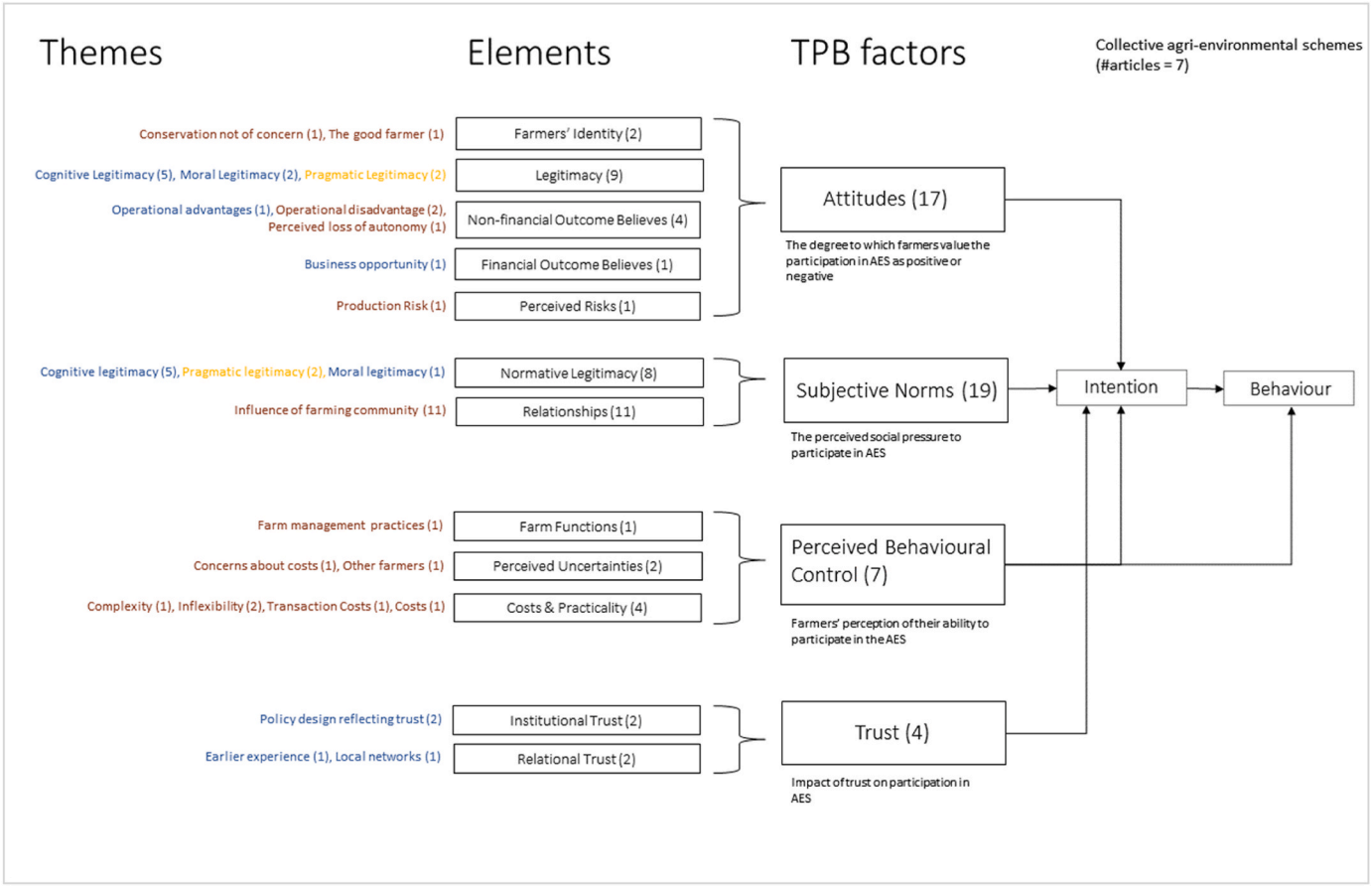

Fig. A2. TPB for collective agri-environmental schemes (adapted from Ajzen 1991).
Using only the statements from research on collective agri-environmental schemes and incorporating them into the TPB.

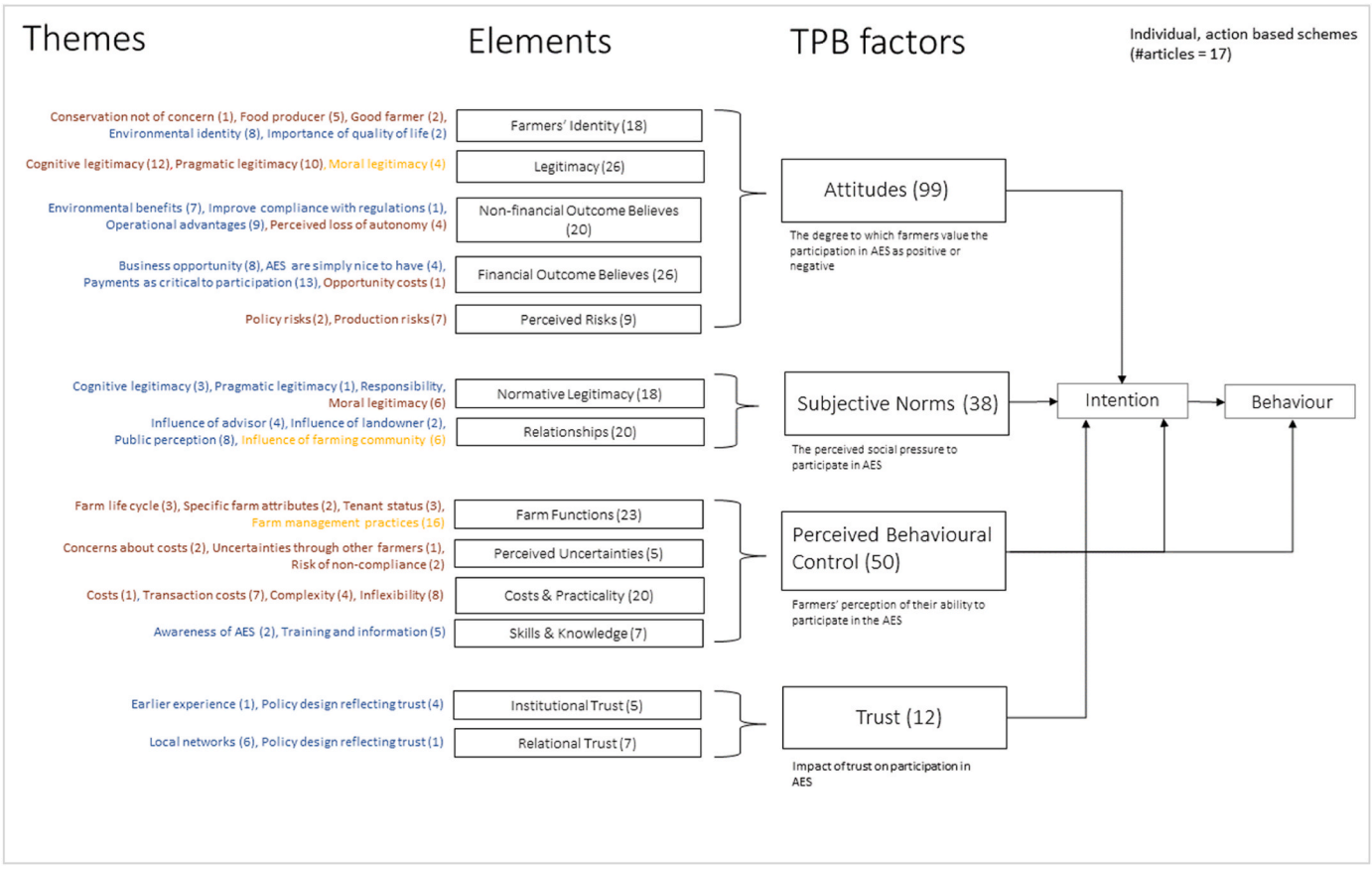

Fig. A3. TPB for individual, action based agri-environmental schemes (adapted from Ajzen 1991).Using only the statements from research on individual, action based agri-environmental schemes and incorporating them into the TPB.

Table A4
Boolean search strings

Search stage	Database	Search term family	Search String	Number of results
Initial search	Web of Science Core Collection and CAB Abstracts and Global Health	Target system	TS=("farm*" OR "producer*" OR "agriculture" OR "landowner*")	Web of Science Core Collection = 483,944 CAB Abstracts and Global Health = 629,622
Initial search	Web of Science Core Collection and CAB Abstracts and Global Health	Agri-environmental scheme	TS=("agri-environmental measure*" OR "agri-environmental contract*" OR "agri-environmental polic*" OR "agri-environmental scheme*" OR "agri-environmental model*" OR "agri-environmental incentive*" OR "agri-environmental subsid*" OR "agri-environmental program*" OR "agri-environment climate measure*" OR "agri-environment climate contract*" OR "agri-environment climate polic*" OR "agri-environment climate scheme*" OR "agri-environment climate model*" OR "agri-environment climate incentive*" OR "agri-environment climate subsid*" OR "agri-environment climate program*" OR "payment* for ecosystem service*" OR "ecosystem service* payment*" OR "conservation auction*" OR "agglomeration bonus" OR "agglomeration payment*" OR "agglomeration scheme*" OR "agglomeration program*" OR "green nudge*" OR "agri-environmental nudge*" OR "collective payment*" OR "collective bonus")	Web of Science Core Collection = 2572 CAB Abstracts and Global Health = 2297
Initial search	Web of Science Core Collection and CAB Abstracts and Global Health	Environmentally friendly practices	TS=("biodiversity" OR "conservation" OR "habitat*" OR "biodiversity strip*" OR "bird nest*" OR "buffer strip*" OR "extens* grassland*" OR "extensive meadow*" OR "extensive pasture*" OR "fallow*" OR "fertilizer" OR "field bird island*" OR "field margin*" OR "flower* strip*" OR "forest pastures" OR "fungicide*" OR "genetic diversity" OR "growth regulator*" OR "hedge*" OR "hedgerow*" OR "herbicide*" OR "hunting aisle*" OR "insecticide*" OR "intercrop*" OR "management of neophyte*" OR "meadow orchard*" OR "neophyte management" OR "nesting aid*" OR "nitrogen-fixing crop*" OR "pesticide*" OR "pond*" OR "riparian buffer strip*" OR "riparian strip*" OR "shrub*" OR "space* seed row*" OR "stone wall*" OR "Streuobstwiese" OR "stubble*" OR "swallow puddle*" OR "wildflower meadow*" OR "wildlife-friendly mow*")	Web of Science Core Collection = 1,039,960 CAB Abstracts and Global Health = 1,238,843

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Table A4 (*continued*)

Search stage	Database	Search term family	Search String	Number of results
Initial search	CAB Abstracts and Global Health and Web of Science Core Collection	Combined search	Combine target group, policy, and focus of the practice by using: #1 AND #2 AND #3	Web of Science Core Collection = 1086 CAB Abstracts and Global Health = 884
Initial search	Scopus	Combined search	(TITLE-ABS-KEY (farm* OR producer* OR agriculture OR landowner*) AND TITLE-ABS-KEY ({agri-environmental contract} OR {agri-environmental contracts} OR {agri-environmental policy} OR {agri-environmental policies} OR {agri-environmental measure} OR {agri-environmental measures} OR {agri-environmental scheme} OR {agri-environmental schemes} OR {agri-environmental model} OR {agri-environmental models} OR {agri-environmental incentive} OR {agri-environmental incentives} OR {agri-environmental subsidy} OR {agri-environmental subsidies} OR {agri-environmental program} OR {agri-environmental programs} OR {agri-environment climate contract} OR {agri-environment climate contracts} OR {agri-environmental climate contract} OR {agri-environmental climate contracts} OR {agri-environmental climate policy} OR {agri-environmental climate policies} OR {agri-environmental climate measure} OR {agri-environmental climate measures} OR {agri-environmental climate scheme} OR {agri-environmental climate schemes} OR {agri-environmental climate model} OR {agri-environmental climate models} OR {agri-environmental climate incentive} OR {agri-environmental climate incentives} OR {agri-environmental climate subsidy} OR {agri-environmental climate subsidies} OR {agri-environmental climate program} OR {agri-environmental climate programs} OR {payments for ecosystem service} OR {payment for ecosystem service} OR {payments for ecosystem services} OR {payment for ecosystem services} OR {ecosystem service payment} OR {ecosystem service payments} OR {ecosystem services payment} OR {ecosystem services payments} OR {biodiversity offset} OR {biodiversity offsets} OR {conservation auction} OR {conservation auctions} OR {agglomeration bonus} OR {agglomeration bonuses} OR {agglomeration payment} OR {agglomeration payments} OR {agglomeration scheme} OR {agglomeration schemes} OR {green nudge} OR {green nudges} OR {agri-environmental nudge} OR {agri-environmental nudges} OR {collective payment} OR {collective payments} OR {collective bonus} OR {collective bonuses}) AND TITLE-ABS-KEY (“biodiversity” OR “conservation” OR “habitat*" OR {bird nest} OR {bird nests} OR {buffer strip} OR {buffer strips} OR {extensive grassland} OR {extensive grasslands} OR {extensive meadow} OR {extensive meadows} OR {extensive pasture} OR {extensive pastures} OR “fallow*" OR “fertilizer” OR {field bird island} OR {field bird islands} OR {field margin} OR {field margins} OR {flower strip} OR {flower strips} OR {forest pasture} OR {forest pastures} OR “fungicide*" OR {genetic diversity} OR {growth regulator} OR {growth regulators} OR “hedge*" OR “herbicide*" OR {hunting aisle} OR {hunting aisles} OR “insecticide*" OR “intercrop*" OR {management of neophyte} OR {management of neophytes} OR {meadow orchard} OR {meadow orchards} OR {neophyte management} OR {nesting aid} OR {nesting aids} OR {nitrogen-fixing crop} OR {nitrogen-fixing crops} OR “pesticide*" OR “pond*" OR {riparian buffer strip} OR {riparian buffer strips} OR {riparian strip} OR {riparian strips} OR “shrub*" OR {spacing seed row} OR {spacing seed rows} OR {stone wall} OR {stone walls} OR “Streuobstwiese*" OR “stubble*" OR {swallow puddle} OR {swallow puddles} OR {wildflower meadow} OR {wildflower meadows} OR {wildlife-friendly mowing})) AND (LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014) OR LIMIT-TO (PUBYEAR, 2013) OR LIMIT-TO (PUBYEAR, 2012) OR LIMIT-TO (PUBYEAR, 2011) OR LIMIT-TO (PUBYEAR, 2010) OR LIMIT-TO (PUBYEAR, 2009) OR LIMIT-TO (PUBYEAR, 2008) OR LIMIT-TO (PUBYEAR, 2007) OR LIMIT-TO (PUBYEAR, 2006) OR LIMIT-TO (PUBYEAR, 2005) OR LIMIT-TO (PUBYEAR, 2004) OR LIMIT-TO (PUBYEAR, 2003) OR LIMIT-TO (PUBYEAR, 2002) OR LIMIT-TO (PUBYEAR, 2001) OR LIMIT-TO (PUBYEAR, 2000)) AND (LIMIT-TO (LANGUAGE, “English”)) AND (LIMIT-TO (SRCTYPE, “j"))	1445
Final search	CAB Abstracts and Global Health and Web of Science Core Collection	Target system	TS=(“farm*" OR “producer*" OR “agriculture” OR “landowner*" OR “agricultural system*” OR “agricultural production system*” OR “landholder*” OR “land manager*“)	Web of Science Core Collection = 390,321 CAB Abstracts and Global Health = 559,010
Final search	CAB Abstracts and Global Health and Web of Science Core Collection	Agri-environmental scheme	TS=(“agri-environmental measure*” OR “agri-environmental contract*” OR “agri-environmental polic*” OR “agri-environmental scheme*” OR “agri-environmental model*” OR “agri-environmental incentive*” OR “agri-environmental subsid*” OR “agri-environmental program*” OR “agri-environment climate measure*” OR “agri-environment climate	Web of Science Core Collection = 4736 CAB Abstracts and Global Health = 3673

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Table A4 (*continued*)

Search stage	Database	Search term family	Search String	Number of results
			contract*" OR "agri-environment climate polic*" OR "agri-environment climate scheme*" OR "agri-environment climate model*" OR "agri-environment climate incentive*" OR "agri-environment climate subsid*" OR "agri-environment climate program*" OR "payment* for ecosystem service*" OR "ecosystem service* payment*" OR "conservation auction*" OR "agglomeration bonus" OR "agglomeration payment*" OR "agglomeration scheme*" OR "agglomeration program*" OR "green nudge*" OR "agri-environmental nudge*" OR "collective payment*" OR "collective bonus" OR "stewardship payment*" OR "conservation tender*" OR "countryside stewardship" OR "agri-environmental agreement*" OR "agri-environment measure*" OR "agri-environment contract*" OR "agri-environment polic*" OR "agri-environment scheme*" OR "agri-environment model*" OR "agri-environment incentive*" OR "agri-environment subsid*" OR "agri-environment program*" OR "conservation stewardship program*" OR "resources conservation program*" OR "agro-environmental measure*" OR "agro-environmental contract*" OR "agro-environmental polic*" OR "agro-environmental scheme*" OR "agro-environmental model*" OR "agro-environmental incentive*" OR "agro-environmental subsid*" OR "agro-environmental program*" OR "environmental quality incentives program*" OR "stewardship scheme*" OR "ecosystem services scheme*" OR "conservation reserve program*" OR "ecosystem services program*" OR "set-aside program*" OR "set-aside scheme*" OR "biodiversity offset*")	
Final search	CAB Abstracts and Global Health and Web of Science Core Collection	Environmentally friendly practices	TS=("biodiversity" OR "conservation" OR "habitat*" OR "biodiversity strip*" OR "bird nest*" OR "buffer strip*" OR "extens* grassland*" OR "extensive meadow*" OR "extensive pasture*" OR "fallow*" OR "fertilizer" OR "field bird island*" OR "field margin*" OR "flower* strip*" OR "forest pastures" OR "fungicide*" OR "genetic diversity" OR "growth regulator*" OR "hedge*" OR "hedgerow*" OR "herbicide*" OR "hunting aisle*" OR "insecticide*" OR "intercrop*" OR "management of neophfcyte*" OR "meadow orchard*" OR "neophyte management" OR "nesting aid*" OR "nitrogen-fixing crop*" OR "pesticide*" OR "pond*" OR "riparian buffer strip*" OR "riparian strip*" OR "shrub*" OR "space* seed row*" OR "stone wall*" OR "Streuobstwiese" OR "stubble*" OR "swallow puddle*" OR "wildflower meadow*" OR "wildlife-friendly mow*" OR "nitrogen reduction*" OR "filter strip*" OR "riparian margin*" OR "grassy margin*" OR "field margin strip*" OR "grazing marsh*" OR "no-tillage"OR "no-till farming" OR "flowering meadow*" OR "cover diversity" OR "postponed mowing" OR "grass buffer*" OR "mulching" OR "ditch bank*" OR "reduced tillage" OR "low-input meadow*" OR "delayed mowing" OR "wildflower strip*" OR "wildflower margin*" OR "buffer zone*" OR "buffer area*" OR "grass margin*" OR "riparian buffer*" OR "conservation tillage" OR "ditch*" OR "species-rich grassland*" OR "field edge*" OR "cover crop*" OR "landscape composition" OR "heterogeneous landscape" OR "complex landscape" OR "agrobiodiversity" OR "landscape fragmentation" OR "complex landscape" OR "landscape heterogeneity" OR "semi-natural grassland*" OR "landscape complexity", "rodenticide*" OR "set-aside" OR "field boundar*" OR "land sharing" OR "land sparing" OR "fertiliser")	Web of Science Core Collection = 917,056 CAB Abstracts and Global Health = 1,186,155
Final search	CAB Abstracts and Global Health and Web of Science Core Collection	Combined search	Combine target group, policy, and focus of the practice by using: #6 AND #7 AND #8	Web of Science Core Collection = 2399 CAB Abstracts and Global Health = 1801
Final search	Scopus	Combined search	(TITLE-ABS-KEY (farm* OR producer* OR agriculture OR landowner* OR landholder* OR {agricultural system} OR {agricultural systems} OR {agricultural production system} OR {agricultural production systems} OR {land manager} OR {land managers}) AND TITLE-ABS-KEY ({agri-environmental contract} OR {agri-environmental contracts} OR {agri-environmental policy} OR {agri-environmental policies} OR {agri-environmental measure} OR {agri-environmental measures} OR {agri-environmental scheme} OR {agri-environmental schemes} OR {agri-environmental model} OR {agri-environmental models} OR {agri-environmental incentive} OR {agri-environmental incentives} OR {agri-environmental subsidy} OR {agri-environmental subsidies} OR {agri-environmental program} OR {agri-environmental programs} OR {agri-environment climate contract} OR {agri-environment climate contracts} OR {agri-environmental climate contract} OR {agri-environmental climate contracts} OR {agri-environmental climate policy} OR {agri-environmental climate policies} OR {agri-environmental climate measure} OR {agri-environmental climate measures} OR {agri-environmental climate scheme} OR {agri-environmental climate schemes} OR {agri-environmental climate model} OR {agri-environmental climate models} OR {agri-environmental climate incentive} OR {agri-environmental climate incentives} OR {agri-environmental climate subsidy} OR {agri-environmental climate subsidies} OR {agri-environmental climate program} OR {agri-environmental climate programs} OR {payments for	Scopus = 2285

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Table A4 (*continued*)

Search stage	Database	Search term family	Search String	Number of results
			ecosystem service} OR {payment for ecosystem service} OR {payments for ecosystem services} OR {payment for ecosystem services} OR {ecosystem service payment} OR {ecosystem service payments} OR {ecosystem services payment} OR {ecosystem services payments} OR {biodiversity offset} OR {biodiversity offsets} OR {conservation auction} OR {conservation auctions} OR {agglomeration bonus} OR {agglomeration bonuses} OR {agglomeration payment} OR {agglomeration payments} OR {agglomeration scheme} OR {agglomeration schemes} OR {green nudge} OR {green nudges} OR {agri-environmental nudge} OR {agri-environmental nudges} OR {collective payment} OR {collective payments} OR {collective bonus} OR {collective bonuses} OR {stewardship payment} OR {stewardship payments} OR {conservation tender} OR {conservation tenders} OR {countryside stewardship} OR {agri-environmental agreement} OR {agri-environmental agreements} OR {agri-environment measure} OR {agri-environment measures} OR {agri-environment contract} OR {agri-environment contracts} OR {agri-environment policy} OR {agri-environment policies} OR {agri-environment scheme} OR {agri-environment schemes} OR {agri-environment model} OR {agri-environment models} OR {agri-environment incentive} OR {agri-environment incentives} OR {agri-environment subsidy} OR {agri-environment subsidies} OR {agri-environment program} OR {agri-environment programs} OR {agro-environment measure} OR {agro-environment measures} OR {agro-environment contract} OR {agro-environment contracts} OR {agro-environment policy} OR {agro-environment policies} OR {agro-environment scheme} OR {agro-environment schemes} OR {agro-environment model} OR {agro-environment models} OR {agro-environment incentive} OR {agro-environment incentives} OR {agro-environment subsidy} OR {agro-environment subsidies} OR {agro-environment program} OR {agro-environment programs} OR {conservation stewardship program} OR {conservation stewardship programs} OR {resources conservation program} OR {resources conservation programs} OR {environmental quality incentives program} OR {environmental quality incentives programs} OR {stewardship scheme} OR {stewardship schemes} OR {ecosystem services scheme} OR {ecosystem services schemes} OR {conservation reserve program} OR {conservation reserve programs} OR {ecosystem services scheme} OR {ecosystem services schemes} OR {ecosystem services program} OR {ecosystem services programs} OR {set-aside program} OR {set-aside programs} OR {set-aside scheme} OR {set-aside schemes}) AND TITLE-ABS-KEY (“biodiversity” OR “conservation” OR “habitat*" OR {bird nest} OR {bird nests} OR {buffer strip} OR {buffer strips} OR {extensive grassland} OR {extensive grasslands} OR {extensive meadow} OR {extensive meadows} OR {extensive pasture} OR {extensive pastures} OR “fallow*" OR “fertilizer” OR {field bird island} OR {field bird islands} OR {field margin} OR {field margins} OR {flower strip} OR {flower strips} OR {forest pasture} OR {forest pastures} OR “fungicide*" OR {genetic diversity} OR {growth regulator} OR {growth regulators} OR “hedge*" OR “herbicide*" OR {hunting aisle} OR {hunting aisles} OR “insecticide*" OR “intercrop*" OR {management of neophyte} OR {management of neophytes} OR {meadow orchard} OR {meadow orchards} OR {neophyte management} OR {nesting aid} OR {nesting aids} OR {nitrogen-fixing crop} OR {nitrogen-fixing crops} OR “pesticide*" OR “pond*" OR {riparian buffer strip} OR {riparian buffer strips} OR {riparian strip} OR {riparian strips} OR “shrub*" OR {spacing seed row} OR {spacing seed rows} OR {stone wall} OR {stone walls} OR “Streuobstwiese*" OR “stubble*" OR {swallow puddle} OR {swallow puddles} OR {wildflower meadow} OR {wildflower meadows} OR {wildlife-friendly mowing} OR {nitrogen reduction} OR {nitrogen reductions} OR {filter strip} OR {filter strips} OR {riparian margin} OR {riparian margins} OR {grassy margin} OR {grassy margins} OR {field margin strip} OR {field margin strips} OR {grazing marsh} OR {grazing marshes} OR {no-tillage} OR {no-till farming} OR {flowering meadow} OR {flowering meadows} OR {cover diversity} OR {postponed mowing} OR {grass buffer} OR {grass buffers} OR {mulching} OR {ditch bank} OR {ditch banks} OR {reduced tillage} OR {low-input meadow} OR {low-input meadows} OR {delayed mowing} OR {wildflower strip} OR {wildflower strips} OR {buffer zone} OR {buffer zones} OR {buffer area} OR {buffer areas} OR {grass margin} OR {grass margins} OR {riparian buffer} OR {riparian buffers} OR {conservation tillage} OR {ditch} OR {ditches} OR {species-rich grassland} OR {species-rich grasslands} OR {field edge} OR {field edges} OR {cover crop} OR {cover crops} OR {landscape composition} OR {heterogeneous landscape} OR “agrobiodiversity” OR {landscape fragmentation} OR {complex landscape} OR {landscape heterogeneity} OR {semi-natural grassland} OR {semi-natural grasslands} OR {landscape complexity} OR {rodenticide} OR {rodenticides} OR {set-aside} OR {field boundary} OR {field	

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Table A4 (*continued*)

Search stage	Database	Search term family	Search String	Number of results
			boundaries} OR {land sharing} OR {land sparing} OR "fertiliser")) AND (LIMIT-TO (SRCTYPE,"j")) AND (LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018) OR LIMIT-TO (PUBYEAR,2017) OR LIMIT-TO (PUBYEAR,2016) OR LIMIT-TO (PUBYEAR,2015) OR LIMIT-TO (PUBYEAR,2014) OR LIMIT-TO (PUBYEAR,2013) OR LIMIT-TO (PUBYEAR,2012) OR LIMIT-TO (PUBYEAR,2011) OR LIMIT-TO (PUBYEAR,2010) OR LIMIT-TO (PUBYEAR,2009) OR LIMIT-TO (PUBYEAR,2008) OR LIMIT-TO (PUBYEAR,2007) OR LIMIT-TO (PUBYEAR,2006) OR LIMIT-TO (PUBYEAR,2005) OR LIMIT-TO (PUBYEAR,2004) OR LIMIT-TO (PUBYEAR,2003) OR LIMIT-TO (PUBYEAR,2002) OR LIMIT-TO (PUBYEAR,2001) OR LIMIT-TO (PUBYEAR,2000)) AND (LIMIT-TO (LANGUAGE,"English"))	

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