

Psychological drivers of conservation policy support: A systematic scoping review of quantitative evidence

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Abstract

In light of the current biodiversity crisis, broader and stricter conservation policies are increasingly required. As is the case of other environmental policies, public support for conservation measures often is a necessary condition for their success. Identifying which factors are associated with citizens' support for conservation policies is thus crucial for policy-making. To do so, we conducted the first scoping review of studies empirically investigating the effect of psychological factors on conservation policy support, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for scoping reviews (PRISMA-ScR). After completing data screening, 66 studies were included in the review and the results were synthesized using both a narrative approach and descriptive statistical analyses. Among the reviewed sources, we found that representational factors (i.e. beliefs, perceptions) have received the most attention from scholars, and normative factors (i.e. social norms) the least. Moreover, wildlife value orientations, knowledge about conservation and environmental issues, and general policy attitudes are the psychological factors most robustly associated with conservation policy support. These results can inform policy makers aiming to improve the design and success of conservation measures.

Keywords: systematic review, scoping review, conservation policy, biodiversity, psychology, public support, PRISMA framework

1. Introduction

Implementing conservation policies is crucial for safeguarding our planet's biodiversity and maintaining ecosystem balance. Conservation policies can effectively protect threatened species and habitats (Bowgen et al., 2022), preventing further loss of biodiversity. By preserving natural resources and promoting sustainable practices, conservation policies also contribute to mitigating climate change and ensuring a more resilient environment for future generations, hence positively impacting human livelihoods (Larsen et al., 2012). As conservation takes place in social-ecological systems containing both human and non-human actors and stakeholders (Berkes & Folke, 1998), not only ecological but also human dimensions of biodiversity conservation must be taken into account by policy-makers. In this perspective, the Convention on Biological Diversity lists "mainstreaming biodiversity across government and society" as a strategic goal (CBD, 2011), and various scholars have argued that successful conservation is dependent on the integration of social concerns and public support (Chan et al., 2007; Lischka, 2018). For instance, a study investigating 90 protected areas in 42 countries identified public engagement as the most important determinant of success (Van Cuong et al., 2017). This raises an important question for both researchers and policy-makers regarding what type of factors influence people's support for biodiversity conservation policies. From a policy point of view, an increased understanding of the determinants of conservation policy support would help to better integrate citizen preferences into the design and the implementation of successful conservation policies, where environmental effectiveness and social acceptability dimensions are aligned.

Existing research investigating the determinants of public support for other environmental policies stresses that sociodemographic factors such as age, gender, education and income generally have small effects on policy acceptability (Ejelöv & Nilsson, 2020). On the other hand, psychological factors have been shown to play an important role in shaping acceptability judgments towards environmental policies across domains (Drews & Van Den Bergh, 2016; Ejelöv & Nilsson, 2020; Huijts et al., 2012). Examples of psychological determinants of environmental policy support include representational factors such as perceived effectiveness and fairness of the policy (Bergquist et al., 2022; Wang et al., 2018), worldviews and value orientations (Harring et al., 2017), emotional factors

such as guilt, worry, interest, and hope (Hignell et al., 2022; Smith & Leiserowitz, 2014), and experiential factors such as exposure to extreme weather events (Owen et al., 2012).

However, to date, no studies have synthesized results on the different psychological factors associated with public support for conservation policy across the literature. Existing reviews focus on specific conservation fields and specific psychological factors (Ihemezie et al., 2021; Lesch & Wachenheim, 2014), or do not measure policy support as their outcome of interest (St John et al., 2010; Thomas-Walters et al., 2023). Conducting a scoping review across psychological factors and across conservation policy domains to investigate variations in policy support thus fills an evidence gap and helps identify psychological mechanisms robustly associated with public support in a variety of policy settings. The aim of this review is therefore twofold: a) identifying and mapping the psychological factors that have been studied in relation to conservation policy support, b) determining which psychological factors are significantly associated with conservation policy support.

2. Methods

We conducted a scoping review to identify and synthesize the various types of psychological factors associated with conservation policy support. A scoping review is a systematic literature review approach that aims to identify, map, and analyze a broad range of studies within a given research field, and to identify relevant research gaps (Arksey & O'Malley, 2005; Munn et al., 2018). This method was selected for its ability to provide an inclusive, high-level overview of a diverse and fragmented body of literature (Peters et al., 2022), which fits the conservation psychology research field given its interdisciplinary nature. Moreover, due to the heterogeneity of the included data and the unsystematic reporting of effect sizes in this research field, a meta-analysis could not be conducted. To guide the structure of this review, we followed the framework of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR, Tricco et al., 2018). The protocol was pre-registered on the Open Science Framework website (<https://osf.io/tqw3d>).

Regarding the scope of this review, we used a broad definition of psychological factors that includes all individual-level processes involving cognitive, affective and/or behavioral components (Fabrigar & Petty, 1999), in line with other systematic reviews (Campbell et al., 2017; Sood et al.,

2022). In addition to purely individual factors, social and collective dimensions of psychology were also considered, as variables such as perceived social norms have been shown to shape pro-environmental attitudes (Bolsen et al., 2014). On the other hand, clinical and personality psychology were not included in the scope of this review, as these factors have not been identified as potential drivers of environmental policy support in previous reviews (Drews & Van Den Bergh, 2016; Ejelöv & Nilsson, 2020). Finally, sociodemographic factors such as age, gender, ethnicity, education level, income or occupation-related variables are also out of the scope of this review.

2.1. Search strategy

Five electronic databases relevant to psychological and conservation studies were searched: Scopus, Web of Science, PsychInfo and Pubmed for published academic literature, as well as ProQuest for grey literature. We also used the PsyArXiv repository to search for preprints related to conservation psychology. To explore our primary research questions, we targeted sources that: i) studied one or several psychological factors as independent variables, and ii) measured conservation policy support as the dependent variable. Query strings were developed based on existing conceptual frameworks identifying different categories of psychological factors such as the cognitive-affective-behavioral model of attitudes (Eagly & Chaiken, 1993), the value-belief-norm model (Stern, 2000) and the theory of planned behavior (Kaiser et al., 2005), as well as existing reviews on similar topics (e.g. the drivers of public support for climate policies, Drews & Van Den Bergh, 2016). Keyword testing and pilot exploration were then used to enhance search comprehensiveness. To limit selection bias, we did not include terms related to psychological factors for searches in PsychINFO and PsyArXiv, as a filter on psychological content is already present via the thematic scope of these registries. Experts in the field of conservation psychology were contacted to review the search algorithm and provide potential additional sources. The full search queries used for this review can be found in Supplementary Note 1. Additionally, we used Research Rabbit (www.researchrabbit.ai) to perform backward and forward citation-tracking on all sources included in the final screening phase, to find relevant sources that may have been missed by the search algorithm (see Supplementary Note 2).

2.2. Inclusion and exclusion criteria

2.2.1. Study method

As the aim of this review is ultimately to inform policy making, we focused on empirical studies, excluding theoretical articles. More specifically, only primary sources that performed quantitative analyses of the relationship between the variables of interest were included in this review, as we used significance tests to determine whether the studied psychological factors were associated with variance in policy support levels. As a result, quantitative sources for which significance tests were not reported (or made available upon request) were also excluded from this review.

2.2.2. Study content

We first excluded studies in which none of the independent variables was a psychological factor as defined above. Consequently, we excluded studies that only investigated the effect of sociodemographic factors such as age, gender, ethnicity, education level, income or occupation-related variables. In terms of study outcomes, we only included sources measuring public attitudes towards wildlife and habitat conservation policies, and excluded studies focusing on household-related conservation measures (energy conservation, water conservation). In addition, we excluded sources that only measured general conservation attitudes (e.g. willingness to protect natural resources in general) and not support for specific conservation policies. Indeed, although a majority of citizens are in favor of broad biodiversity conservation goals, public support declines when specific programs or measures are presented (McCune et al., 2017; Responsive Management, 2011), making support for specific policies a more realistic outcome to capture public preferences. Moreover, we only included sources that studied public support for conservation policies prior to implementation (i.e. acceptability studies *versus* acceptance studies) based on two justifications: a) baseline levels of support for public policies vary before and after implementation (Jagers et al., 2017; van Wee et al., 2023), and b) the psychological variables investigated in post-implementation studies mostly relate to observable policy outcomes or management (e.g. actual policy impacts, actual forms of governance), which limits comparability with pre-implementation studies and would be better addressed with a separate review.

2.2.3. Other criteria

We excluded sources that targeted children, as several measures of policy support include voting behavior or payment tasks. Moreover, we only included studies that targeted the general public and not specific subgroups of the population (e.g. fishers, scientists, farmers) due to the high heterogeneity across the subgroups studied, and low comparability with general public samples because of varying degrees of expertise and stakes. We did not apply any filter on publication date: all search results available online before our search date (December 12th 2023) were considered. However, we only included studies written in English and for which a full-text version was accessible or made available upon request.

2.3. Screening

After removing duplicates with an automation tool (Borissov et al., 2022), we conducted three rounds of data screening (titles, abstracts, full-text), each performed independently by two screeners. Each screener was provided the list of inclusion and exclusion criteria presented above. Importantly, for sources that reported several studies conducted on independent samples, each study was screened separately. Inter-rater reliability for each screening phase was calculated using Cohen's kappa (Cohen, 1960; McHugh, 2012), to measure internal consistency between the two screeners. Traditionally, kappa levels between 0.7 and 0.8 indicate an acceptable agreement, between 0.8 and 0.9 a strong agreement, and above 0.9 a near-perfect agreement. Disagreements at the end of each screening stage were discussed orally between the two screeners until an agreement was reached for each source.

2.4. Extraction

From each included study, we extracted the following data: a) *metadata*: author(s) name(s), journal name, year of publication; b) *study context*: study aim, study location, policies of interest; c) *study methods*: study design, sample size, data collection procedure and period, sample characteristics,

description of the dependent and independent variables of interest, description of controls, mediators and moderators, analysis method; d) *study results*: description of significant ($p < 0.05$) and non-significant direct effects of the independent variables on the dependent variables, as well as the direction of the effect and reported p-values; e) *risk of bias indicators*: pre-registration document, data availability, declared conflict(s) of interest. For sources that reported several studies conducted on independent samples, each study was extracted separately. Extraction was performed independently by two data extractors. One extractor retrieved all the data variables described above while the other extractor only retrieved the variables of interest to answer the main research questions (policies of interest, study design, independent variables of interest, dependent variables of interest, analysis method, study results). Disagreements were resolved by discussion between the two extractors.

2.5. Quality assessment

To critically appraise the quality of the included sources, we used the Mixed Methods Appraisal Tool (Hong et al., 2018), which assesses study quality with a list of five evaluation criteria specific to study type. We specifically used the evaluation criteria for quantitative randomized studies and observational studies, since all the included studies fell into these two categories. For quantitative randomized studies, examples of the evaluation criteria include the randomization procedure, blinding, and manipulation checks. For observational studies, examples of assessed items include the sampling strategy, representativeness and the risk of non-response bias (see Supplementary Note 3 for a detailed description of all items). As recommended by the authors of the framework, evaluation criteria are adapted to be relevant within the research field reviewed (Hong et al., 2018). Assessors report “yes”, “no” or “cannot know” for each assessed item per study. Calculating an overall score from the ratings of each criterion (i.e. aggregating the number of “yes” and “no” to compute a global numerical score) is discouraged in this framework, in line with many scholars who have argued that numerical quality scoring of sources can introduce important methodological biases (Fenton et al., 2015). We thus attributed one of three quality categories (high quality, medium quality, low quality) to each source based on a qualitative appreciation of the rated criteria, taking into account each study’s specificity. As excluding studies with low methodological quality is usually discouraged in systematic

reviews (Page et al., 2021), quality assessment is not used as a screening criterion but rather as an informative tool to review results and perform sensitivity analyses when necessary.

2.6. Data analysis and synthesis

We used a narrative approach to synthesize study results, complemented by descriptive statistical analyses to summarize study characteristics across sources (e.g. study context, study design, variable types). Some analyses were directly performed on raw data variables from the extraction phase (e.g. sample size), while others required data transformation such as categorization (e.g. variable types). To identify and map the psychological factors studied in relation to conservation policy support, we relied on existing theoretical frameworks (such as the value-belief-norm model in environmental psychology (Stern, 2000), definitions of psychological concepts according to the American Psychological Association (APA, 2024), categorizations of psychological factors used in related reviews (Drews & Van Den Bergh, 2016; Ejelöv & Nilsson, 2020), as well as thematic mapping from a pilot coding stage to add and refine category templates. This resulted in the creation of ten categories: *values*, *representations*, *norms*, *knowledge*, *emotions*, *preferences and attitudes*, *sense of identity*, *engagement*, *exposure* and *recreational behavior*. These categories were filled with all the psychological variables extracted from the reviewed sources, as well as their respective coded results on policy support (significance and effect direction). Importantly, our classification process was based on the terms used by the authors to describe the psychological variables they investigated (i.e. a variable described as a “value” was placed in the “values” category). To enhance comparability with regards to the direction of effects, we reverse coded results from studies where anti-conservation (rather than pro-conservation) policy support was the measured outcome. To synthesize results, we used a counting method to identify the number of studies reporting significant and/or non-significant effects per psychological construct investigated, similarly to other systematic reviews in the field of environmental psychology (Ihemezie et al., 2021). Due to the heterogeneity of the included data and the unsystematic reporting of effect sizes, we did not conduct a systematic quantitative comparison of effect size estimates across the reviewed sources.

3. Findings

The database search yielded 5,709 results, 200 additional results were retrieved from the repository search, and 10 sources were identified by alternative search strategies. After duplicate removal using an automation tool (Borissov et al., 2022), 3466 search results were screened using titles. This first screening stage resulted in 790 sources being screened using abstracts. Among them, 232 were kept to assess full-text eligibility. The eligibility criteria were met by 47 sources, which were then used to perform backward and forward citation-tracking. This resulted in 17 additional sources that met the eligibility criteria. A total of 64 records were thus included in the review, resulting in 66 independent studies when accounting for multiple studies per source (see Figure 1). Inter-rater reliability was high for each screening stage ($\kappa_{\text{Titles}} = 0.81$, $\kappa_{\text{Abstracts}} = 0.90$, $\kappa_{\text{Full-texts}} = 0.90$, $p\text{-value} < 0.05$), indicating strong between-screeners agreement.

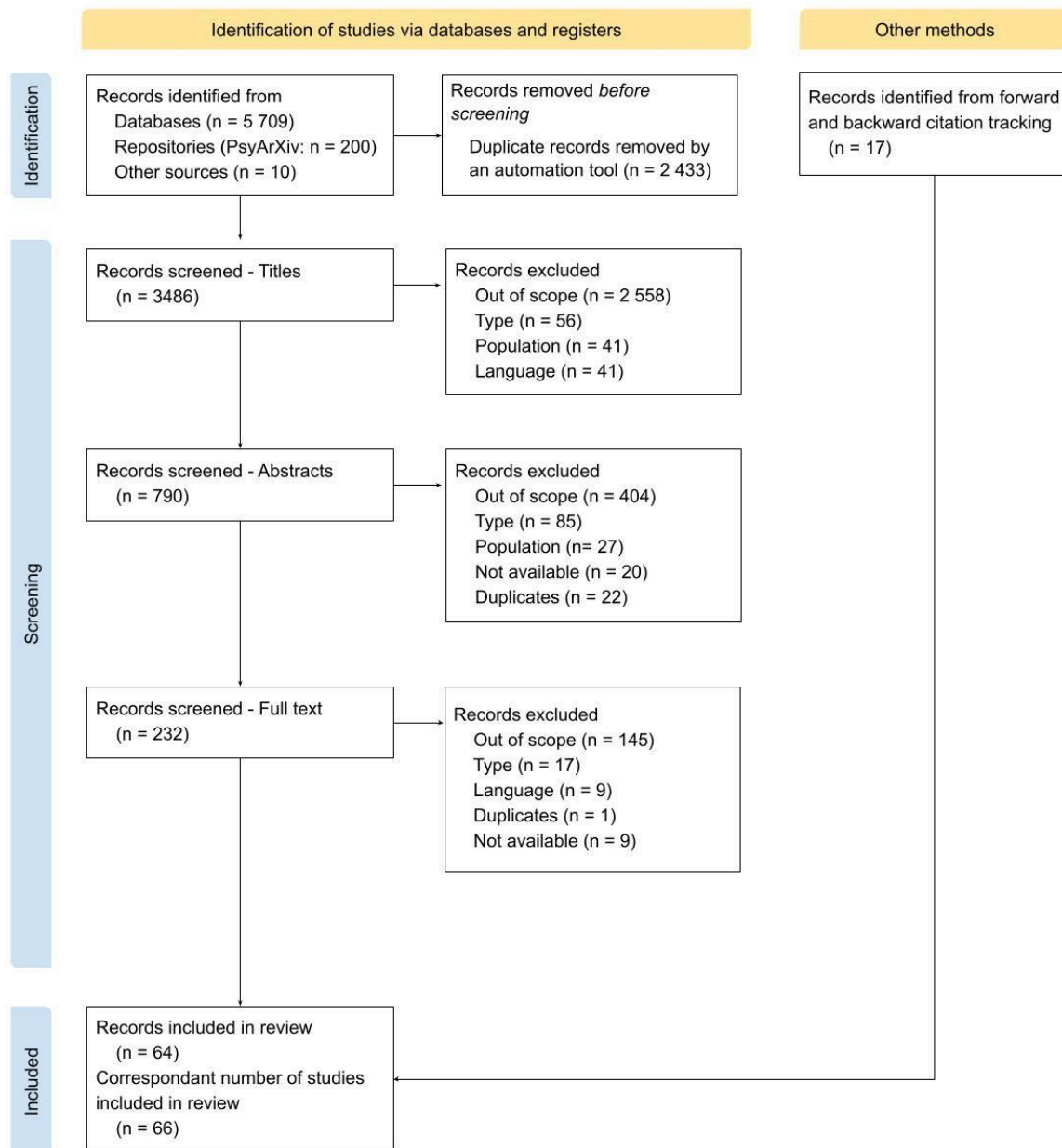


Figure 1. PRISMA flow chart reporting the systematic search and selection process for this review.

3.1. Study characteristics

In this section we provide descriptive quantitative analyses on the prevalence of various study characteristics among the reviewed sources. It should be noted that several studies investigate more than one type of conservation policies, or combine different methods such that the reported percentages do not necessarily sum up to 100.

All reviewed studies were published between 1985 and 2024, with 79% of studies published after 2010 (Figure 2A). Most studies were conducted in North America and Europe (44% and 29% respectively), followed by Asia (17%). 17% of studies were conducted in regions defined as biodiversity hotspots, i.e. regions containing a high level of species diversity, many endemic species, and a significant number of threatened or endangered species (Myers et al., 2000) (Figure 2C). The most prevalent type of conservation policy studied was species management measures (47%) such as population control, followed by habitat protection policies (32%) such as protected areas, habitat restoration and revitalization measures (21%) and finally species (re)introduction (17%) (Figure 2F). Only 12% of studies presented participants with real policy scenarios under consideration by public authorities, while the rest used hypothetical policy scenarios (although often based on real-world policies or projects).

Regarding study methods, all studies used a questionnaire survey to collect responses. Only 11% of studies used an experimental design, while 89% used observational designs (Figure 2D). All studies but one were cross-sectional. Sample sizes for our analyses of interest (i.e. the effect of psychological variables on conservation policy support) varied between 102 and 4183, with a median of 659 (Figure 2B). Policy support was measured using Likert scales of stated agreement in 61% of studies, willingness-to-pay tasks in 26% of studies, and policy choice tasks (e.g. conjoint experiments) in 20% of studies (Figure 2E). The most prevalent analysis method was regression models (75%), followed by group differences tests such as ANOVAs, t-tests, and chi-squared tests (15%) and finally correlation tests (12%).

Regarding quality assessment and risk of bias indicators, 42% of studies were rated as high quality using the MMAT criteria, 56% were rated as medium quality, and only one study was rated as low quality (see Supplementary Note 3). All published articles included in the review followed a peer-review process. None of the reviewed studies declared a conflict of interest. Turning to open practices, none of the reviewed studies were pre-registered, and only 20% provided available data. Additional analyses and data visualizations are provided in Supplementary Note 4.

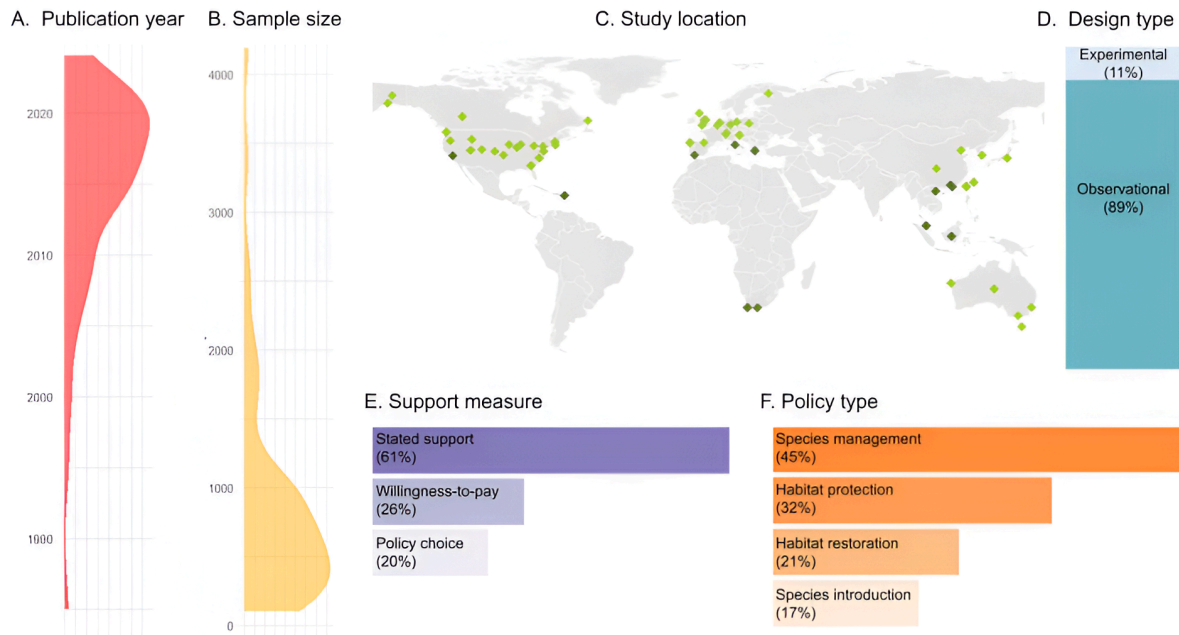


Figure 2. Representations of six study characteristics across the reviewed sources. **A.** Density plot showing the publication year distribution. **B.** Density plot showing the sample size distribution. **C.** World map depicting study location, with dark green diamonds corresponding to studies conducted in biodiversity hotspots (Myers et al., 2000). **D.** Barplot showing the prevalence of design types (observational or experimental). **E.** Barplot showing the prevalence of tasks used to measure policy support (stated support, willingness-to-pay, choice experiments). **F.** Barplot showing the prevalence of policy types investigated (species management, species (re)introduction, habitat protection, habitat restoration). *Note:* several studies investigate more than one type of conservation policies, or use several support measures, such that the reported percentages do not sum up to 100.

3.2. Psychological factors associated with conservation policy support

All psychological factors investigated as independent variables of conservation policy support in the reviewed studies were classified into the ten categories mentioned in the data analysis section. It is important to note that many sources study various categories of factors, as well as several variables within a category. Mental representations (i.e. beliefs, perceptions) was the psychological category that received the most attention from scholars (49% of the reviewed studies), followed by values (32%), knowledge (31%), preferences and attitudes (31%), recreational behavior (25%), sense of identity (22%), engagement (20%), emotions (20%), exposure (15%) and finally norms (9%).

In the sections below, we examine quantitative findings in the reviewed sources to assess the relationship between psychological factors and conservation policy support for each of the ten psychological categories identified. Studies were numbered between 1 and 66 to facilitate referencing when synthesizing results (see Extended Table A for the full correspondence list). A summary table of all findings is provided in Table 1.

3.2.1. Values

Values can be defined as “internalized cognitive structures that guide choices by evoking a sense of basic principles of right and wrong, a sense of priorities, and a willingness to make meaning and see patterns” (Oyserman, 2015). Three main value types have been studied in the reviewed sources: wildlife value orientations (7,12,14,19,23,47,55,56,57,62,64,66), environmental value orientations (8,11,23,27,28,29,34,38,42,54), and general human values (34,35). Wildlife value orientations (WVOs) have been described as the integration of basic beliefs and values that shape an individual’s views about wildlife, predicting their attitudes and behavioral intentions (Manfredo, 2009; Manfredo et al., 1999). WVOs are often clustered into two categories: *mutualism/preservationism* (considering that wildlife species are relatively equal to humans and possess an existence value) and *domination/utilitarianism* (considering that humans are superior to other animals and can use them for their benefit). Significant associations between WVOs and conservation policy support were found in ten studies out of twelve (7,12,14,23,47,55,56,57,64,66). Most often, participants scoring higher in mutualism or preservationism, and lower in domination or utilitarianism, display more support for restoration and recovery policies, and less support for policies which harm wildlife. However, in a study conducted in Switzerland, participants scoring higher in nature appreciation and lower in utilitarianism preferred more intensive interventions to remove invasive alien species (14). It is important to note that WVOs were not significantly associated with conservation support in several policy contexts (12,19,23,56,62,64,66).

Environmental value orientations are clusters of values reflecting concern, beliefs, and attitudes towards environmental issues (De Groot & Steg, 2007; Stern & Dietz, 1994). Most of the reviewed studies used a version of the biospheric-altruistic-egoistic model of environmental values in

which biospherism (or ecocentrism) reflects a value of the environment for its own sake, altruism or anthropocentrism a value of the environment centered on the protection of humans, and egoism a value of the environment based on self-interest (Schultz et al., 2005). In the reviewed studies, participants displaying a strong biospheric orientation usually showed more support for pro-conservation policies (8,23,29,34,42,54). Regarding the effect of altruistic values, most studies found no statistically significant effects on conservation policy support (11,23,27,29,34). The pattern is mixed for egoistic values: depending on the studied policies, the effect is either positive (28,23), negative (27,29), or non-significant (11,23,34).

Finally, two studies investigating general human values such as traditionalism, openness to change, and self-transcendence, did not reveal significant associations with pro-conservation support (34,35).

3.2.2. Representations

Mental representations are thoughts, perceptions and beliefs that individuals hold towards a particular object. Six main categories of mental representations have been studied in the reviewed sources: perceived policy costs and impacts (3,11,16,19,45,46,51,53,58,62,63), perceptions and beliefs about species or habitats (17,19,24,35,57,62), perception of conservation or environmental issues (4,16,35,54,57,61,65), risk perception (9,10,11,19,21,24,34,38,56), perceived behavioral control (18,22,30) and perceived trustworthiness of managers (53,58,62). Perceptions of policy cost and impacts was the most studied type of representational factors among the reviewed sources. Three studies out of four found significant negative effects of perceived policy cost on conservation policy support (3,46,66). Results are mixed regarding perceived policy impact: while six studies find only significant (positive) associations with policy support (11,46,58,62,63,66), six other studies report both significant and non-significant effects depending on the outcomes studied and the policies investigated (3,16,19,45,51,53). For example, the support of Burgeo residents for the designation of a National Marine Conservation Area is significantly influenced by their belief that this policy will improve marine conservation and benefit economic development, but not by the perceived impact on industry and fishing activities (45).

Regarding perceptions and beliefs about species or habitats, perceiving the target species as a personal problem or nuisance was found to be negatively correlated to pro-conservation policy support in all relevant studies (19,24,57). Perception of species (or area) beauty was not found to be a significant predictor of policy support in two studies (19,62), while another study found that it lowered support for invasive plant species removal in Switzerland (17). Finally, anthropomorphism (i.e. attributing human characteristics to non-human species) decreased support for lethal control as a management policy for native and non-native species in Germany (35).

Turning to the perception of conservation issues, studies investigating the perceived importance of biodiversity and its benefits for humans (i.e. ecosystems services) found both significant and non-significant results on conservation support depending on the benefits studied (4,16). For example, in a study conducted in Finland, participants who perceived the importance of boreal forest streams to mitigate floods showed more support for a forest stream restoration program, but the importance attributed to species' protection was not a significant predictor of policy support (16). On the other hand, participants who more strongly perceived negative consequences of a given species on ecosystems displayed higher support for population control of these species (35,57,61,66), with only one study where the effect was not observed at a statistically significant level (65). Finally, believing that climate change is a serious problem and that governmental spending on land management is too low was found to increase support for ecosystem conservation policies in the US (54).

Regarding risk perception, most studies measured either whether non-human species (or ecosystems) are deemed at risk (19,21,34), or whether humans perceive threat from wildlife (9,10,11,19,24,38,56). The majority of studies investigating the belief that species and ecosystems are endangered or vulnerable found significant evidence that risk perception is positively correlated to conservation policy support (19,21,34). On the other hand, mixed results were evidenced regarding the belief that wildlife threatens humans and their livelihood: threat perception significantly lowers pro-conservation support in some policy contexts (11,24,38,56), while it is not a significant predictor in others (9,10,11,19,56). Interestingly, perceiving threat on one's livelihood from grizzly bear reintroduction in California was negatively associated with support for this policy, while perceiving threat on one's safety was not a significant predictor (11).

Three studies investigated the effect of perceived behavioral control or agency (i.e. the evaluation of the difficulty or ease of performing a certain action) on conservation policy support. Perceived behavioral control or agency in this context refers to one's perceived ability to take an active part in conservation, for example through payment, participation in public hearing or involvement in the policy process. Two studies found positive associations between perceived behavioral control and pro-conservation policy support (22,30), but a study conducted in Spain found a null effect on support for an annual household tax financing park conservation (18).

Finally, all studies measuring the effect of perceived trustworthiness of conservation managers found significant positive associations with pro-conservation policy support (53,58,62).

3.2.3. Social norms

Social norms correspond to perceived informal rules regarding appropriate or typical behaviors and attitudes in a given context. Two types of social norms can be distinguished: a) *injunctive norms* indicating what behaviors or attitudes are considered proper, b) *descriptive norms* indicating what behaviors or attitudes usually take place. In the reviewed sources, more studies investigated injunctive norms (18,19,27,40,62) than descriptive norms (18,30). In the context of environmental conservation, injunctive norms refer to a sense of perceived obligation and responsibility about environmental protection (often named *moral norms*), while descriptive norms reflect the perception of other people's attitudes towards environmental protection (also named *subjective* or *personal norms*). Among the studies investigating injunctive norms, all found a positive significant association with pro-conservation policy support (18,19,27,40,62). Among the studies measuring descriptive norms, the evidence is mixed: one study did not find any significant association with support for the conservation of an urban park (18), while another study found a significant positive association with public support for protected area expansion (30).

3.2.4. Knowledge

Knowledge corresponds to the range of one's understanding or information about a given topic. It can be measured objectively through tests, or subjectively by self-assessment. Two main types of knowledge variables have been investigated in relation to conservation policy support: knowledge about species (1,2,9,10,11,14,17,35,52), and knowledge about conservation or environmental issues

(4,21,26,27,31,32,33,34,39,44). Among the sources studying species knowledge (e.g. taxonomic knowledge, knowledge about nativity), the evidence is mixed: four studies found no statistically significant relationship between species knowledge and pro-conservation policy support (1,9,10,52) while five studies reported positive associations (2,11,14,17,35). Among the sources investigating conservation and environmental knowledge (e.g. knowledge of protected areas, awareness of habitat loss, knowledge of ecosystem services), positive associations with pro-conservation policy support were evidenced in seven studies out of ten (26,27,31,32,34,39,44).

3.2.5. *Emotions*

Emotions can be defined as reaction patterns to an event, involving experiential, behavioral, and physiological elements. Three main types of emotions have been studied in the reviewed sources: emotions toward target species or habitats (15,24,25,35,38,43,55,59,63), emotions towards conservation issues (20,44), and individual emotional states (3,22). For the first category, three studies found that general positive (or negative) emotions towards species were negatively (or positively) associated with support for policies that harm wildlife (24,35,59). Six other studies focused on specific emotions, the majority of which evidenced significant associations between the studied emotion and policy support. For instance, three studies found significant negative associations between fear of species and support for species conservation (25,38,55), although results vary across species and policies. One study found a significant effect of anger towards wolves on public support for different wolf management options (43), whereas no significant effects of anger on policy support were observed in two other studies (25,38). Specific positive feelings towards species and ecosystems such as sympathy, joy, and attachment were significantly associated with conservation policy support (15,25,43). Turning to conservation-related emotions, passion and concern for nature conservation were found to positively predict pro-conservation support (20,44). Finally, the evidence is mixed for the effect of individual emotional states: while feelings of safety and lack of worry positively correlated with support for protection policies (22), happiness and general financial concern were not significant predictors (3,22).

3.2.6. Preferences and attitudes

Attitudes correspond to general evaluations of a given object, person, group or issue, ranging from negative to positive. Preferences are also general evaluations involving a valence dimension, but are usually formed within a given set of alternatives. Two main types of preferences and evaluative attitudes were investigated: attitudes or preferences towards species (1,9,10,20,50,59,61), and general policy attitudes (5,6,15,18,21,27,30,33,40,46,48,52,58,63). All seven studies exploring the effect of evaluative attitudes towards species found a significant association with conservation policy support (1,9,10,20,50,59,61), such that positive attitudes towards the target species predicted higher support for this species' protection or restoration, and lower support for policies harming this species (e.g. lethal control). Regarding general policy attitudes (e.g. satisfaction with current policies, general opinion about conservation strategies), eleven studies out of fourteen found significant effects on public support for specific conservation policies (5,6,15,19,21,27,33,40,46,48,63), such that more positive conservation attitudes led to higher support for new policy scenarios.

3.2.7. Sense of identity

An individual's sense of identity can be derived from a set of characteristics perceived as constitutive of the individual, as well as a range of affiliations and social roles. Two types of identity-related factors have been studied in the reviewed sources: place identity (1,5,6,8,15,36), and group identity (6,11,19,21,33,34,41,61). We here define place identity as a feeling of connection and identification to a location/territory/environment and group identity as an identification to various social and political groups (e.g. farmers, environmentalists, liberals, conservatives). Positive associations between local place identity (e.g. identification with local rivers, peatlands or townships) and pro-conservation policy support were found in all relevant studies (8,15,36). National identification, on the other hand, was not a strong predictor of support for forest logging in Poland (5,6). Finally, the effect of identifying with the natural environment in general (i.e. nature-relatedness) on conservation policy support was mixed: while one study conducted in the USA evidenced a positive association between identification with nature and support for open space conservation (36), two studies did not report significant effects of nature-relatedness on policy support (1,51).

Turning to group identity, significant associations between socio-environmental identity (e.g. agricultural, environmental, conservationist) and policy support were evidenced in the two relevant studies (41,61), such that participants identifying as farmers were more supportive of wildlife control measures than environmentalists or conservationists. Besides, among the six studies on political identity, four found it to be a significant determinant of conservation policy support (6,19,21,33), such that participants identifying as left-wing (e.g. liberals, democrats) display more support for pro-conservation policies than participants identifying as right-wing (e.g. conservatives, republicans).

3.2.8. Engagement

Behavioral engagement can be defined as an active, goal-driven involvement and participation in a given activity or setting. The vast majority of sources studying engagement-related factors focus on environmental engagement (1,2,9,10,13,17,32,38,39,51,58,66), such as belonging to an environmentalist or conservationist organization, as well as supporting or participating in environmental initiatives. Among these sources, the evidence is mixed: significant positive associations with pro-conservation policy support have been found (2,13,32,38,39,51,58), but also many non-significant effects (1,9,10,17,38,39,51,66). One study investigating political engagement in the form of voting participation did not find a significant effect on participants' support for establishing wildlife areas and refuges (34). Finally, one study investigating support for orangutan protection policies in both Malaysia and Indonesia found no significant effect of a composite score assessing participation in a range of organizations (e.g. religious, political, cultural, environmental) (22).

3.2.9. Exposure

Exposure corresponds to the experience of having encountered a given entity or situation, and its induced psychological effects. Two types of exposure-related factors have been studied in the reviewed sources: familiarity with wild animals and natural habitats (2,13,19,20,32,52,54,56), and exposure to domesticated species (9,10,66). The effect of familiarity with wildlife and wilderness (e.g. having seen or heard wild species in one's proximate environment, living near natural habitats) on conservation policy support is mixed. While some significant associations between familiarity with species and policy support have been evidenced (20,32,54), most studies did not find statistically significant effects (2,13,19,52,54,56). Finally, no significant associations between exposure to

domestic animals (i.e. owning pets and/or livestock) and conservation policy support were found across all relevant studies (9,10,66).

3.2.10. Recreational experience

The experiential approach in motivational research defines recreation as a “psychophysiological experience that is self-rewarding, occurs during nonobligated free time, and is the result of free choice” (Manfredo et al., 1996). Two main types of recreational experiences have been studied in the reviewed sources: visits to natural areas and conservation parks (20,27,32,34,40,49,51) and taking part in nature-related activities such as hunting, fishing, birdwatching, hiking or gardening (1,9,10,13,14,37,40,54,56,60,66). Focusing first on area visiting, five sources out of seven found significant associations with conservation policy support (20,27,32,40,49). While most associations are positive, one study found that Australians were less likely to support wildlife management policies within the Ningaloo marine park if they had visited it or other marine parks before (32). Regarding nature-related activities, the hypothesised relationship with conservation policy support did not reach statistical significance in a vast majority of studies (1,9,10,13,37,40,54,56,60,66). Exceptions include some significant associations between hunting and conservation support varying in direction depending on the studied policies (1,56,60,66), and a positive association between gardening and support for invasive species management in Switzerland (14).

	Minority of significant results	Mixed results	Majority of significant results
Large evidential basis	Nature-related activities	Environmental value orientations Perceived policy costs and impacts Environmental engagement	Wildlife value orientations Knowledge about conservation and environmental issues General policy attitudes
Medium evidential basis	Familiarity with wild species and habitats	Risk perception Beliefs about conservation and environmental issues Knowledge about species Place identity	Injunctive norms Attitudes and preferences towards species Beliefs about species and habitats Emotions towards species and habitats Socio-political identity Visits to natural areas and conservation parks
Small evidential basis	General human values Exposure to domesticated species	Individual emotional states Descriptive norms	Perceived trustworthiness of wildlife managers Emotions towards conservation issues Perceived behavioural control

Table 1. Summary findings of psychological factors investigated in relation to conservation policy support among the 66 reviewed studies, classified along two dimensions: (i) *association results* (majority/minority of significant results: more/less studies reporting significant results than studies reporting non-significant results with a difference greater or equal to 2, mixed results: equal number of studies reporting significant and non-significant results, or differing by 1) and (ii) *evidential basis* (small evidential basis: less than 5 studies, medium evidential basis: between 5 and 9 studies, large evidential basis: 10 or more studies).

4. Conclusion and discussion

This systematic scoping review analyzed findings from 66 empirical studies measuring associations between psychological factors and support for conservation policies. This review first provided

relevant insights regarding the characteristics of the studies belonging to this research field. A vast majority of the reviewed sources were published after 2010, with many studies published after 2020. This shows that studying psychological determinants of conservation policy support is a relatively recent research focus. A majority of studies were conducted in North America and Western Europe, demonstrating an imbalance towards specific societies. Survey questionnaires were the only research design used in the reviewed sources, with an overwhelming majority of cross-sectional observational designs. As a result, findings from this research field are mostly correlational and more research is needed to establish causal relationships between psychological factors and conservation policy support.

Turning to the identification of psychological factors investigated in relation with conservation policy support, we found that the most studied category of factors were mental representations (i.e. beliefs, perceptions), present in half of the reviewed sources, and that normative factors were the least studied. Within the categories of psychological factors identified in this review, the large diversity of constructs investigated is to be highlighted, ranging from risk perception to wildlife value orientations, or place identity. Some psychological constructs, however, are under-studied, such as the perceived trustworthiness of wildlife managers, exposure to domesticated species, or perceived descriptive norms. Hence more research is needed to draw robust conclusions about their relationship with conservation policy support. Moreover, some psychological variables would benefit from a more fine-grained conceptualization and operationalization in order to increase their comparability across studies, such as risk perception (e.g. is the risk perceived for the ecosystem or for the individual?), or attitudes towards species (e.g. the attributes that participants rate, such as agreeableness or aesthetic value, could be harmonized across species). Despite these empirical and theoretical gaps, the diversity of psychological mechanisms investigated in the reviewed sources, as well as the diversity of policy situations studied (e.g. protected area expansion, river revitalization, invasive species management) allow for a broad understanding and generalization of conservation policy support determinants across different contexts.

By focusing on quantitative studies, this review allows to determine which psychological factors are statistically associated with conservation policy support. The most robust predictors of conservation policy support (studied by at least ten different studies) are the following: a) wildlife value

orientations, such that support increases with mutualist stances and decreases with domination viewpoints, b) knowledge about conservation and environmental issues, positively correlated with policy support, c) general policy attitudes, such that satisfaction towards conservation policies already implemented and general attitudes in favor of nature conservation are positively related to public support for specific conservation policies under consideration by policy-makers. On the contrary, the relationship between engaging in nature-related activities (e.g. fishing, hunting, birdwatching) and conservation policy support is most often not significant in the reviewed studies, as is the relationship between support and familiarity with wild species and habitats. Regarding the various psychological constructs for which results are mixed (e.g. environmental engagement, place identity), more research is needed to determine more precisely in which contexts they are significantly associated with conservation policy support.

Some of the results obtained in this review are in line with those obtained in reviews investigating the predictors of public support for environmental policies other than conservation-related measures. For instance, associations between policy support and environmental knowledge, moral norms and political identity have been evidenced in other environmental domains (Drews & Van Den Bergh, 2016; Ejelöv & Nilsson, 2020). On the other hand, some psychological factors that were found to be significant predictors of policy support in other environmental domains do not display consistent effects regarding conservation policy support, such as risk perception, environmental value orientations and perceived policy impacts. Moreover, some psychological variables that significantly predict pro-environmental behavior and attitudes do not necessarily increase conservation policy support. For instance, feeling connected to nature has been shown to be an important predictor of ecological behavior and subjective well-being (Mayer & Frantz, 2004), but engaging in nature-related activities and being familiar with wild species and habitats tends not to be associated with conservation policy support in the present review.

Since effect sizes were not consistently reported in the reviewed sources, a meta-analysis could not be conducted to synthesize the extracted results. Hence, this systematic review identifies the likelihood of associations between the studied psychological variables and conservation policy support, but does not provide association strength estimates. Additionally, methodological choices can impact the findings of the present review. Particularly, as there is no single harmonized framework

listing all existing categories of psychological factors nor all types of conservation policies, some relevant subfields may be missing from this review despite the various search strategies put in place to limit selection bias (i.e. expert validation of the search algorithm, iterative pilot searching, use of several databases and repositories, citation-tracking). Moreover, the use of a vote counting method allows to quantitatively compare findings when effect sizes are not consistently reported across studies, but this analysis strategy gives an equal weight to all sources, independently of sample size and methodological design (Bushman & Wang, 2009).

In spite of these limitations, we hope that insights from this review can inform policy-making by better integrating citizens' perceptions, preferences, experiences and behaviors into the design and implementation of effective conservation policies. For instance, given that conservation knowledge and wildlife value orientations are robust predictors of conservation policy support, the integration of more biodiversity-related knowledge, and mutualist viewpoints into educational programs and information campaigns could be a relevant avenue for policy-makers.

Pre-registration. The method used to conduct this systematic scoping review was pre-registered at <https://osf.io/fqzvx/>.

Data and code availability. Data and analysis code to reproduce the presented analyses are available at <https://osf.io/fqzvx/>.

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Competing interests. The authors have declared that no competing interests exist.

Extended Table A. References of all included studies and correspondent identification number

ID	Reference of the study (APA)
1	Alif, Ž., Crees, J. J., White, R. L., Quinlan, M. M., Kennerley, R. J., Dando, T. R., & Turvey, S. T. (2023). Understanding local knowledge and attitudes toward potential reintroduction of a former British wetland bird. <i>People and Nature</i> , 5(4), 1220–1233.
2	Buteau, R. J., Urbanek, R. E., & Dumas, C. (2022). Public interactions, attitudes, and conflict regarding management of a “novel” urban species. <i>Human Dimensions of Wildlife</i> , 27(1), 16–31.
3	Chen, W. Y., Aertsens, J., Liekens, I., Broekx, S., & De Nocker, L. (2014). Impact of Perceived Importance of Ecosystem Services and Stated Financial Constraints on Willingness to Pay for Riparian Meadow Restoration in Flanders (Belgium). <i>Environmental Management</i> , 54(2), 346–359.
4	Chen, W. Y., & Jim, C. Y. (2010). Resident Motivations and Willingness-to-Pay for Urban Biodiversity Conservation in Guangzhou (China). <i>Environmental Management</i> , 45(5), 1052–1064.
5	Cislak, A., Wojcik, A. D., & Cichocka, A. (2018). Cutting the forest down to save your face: Narcissistic national identification predicts support for anti-conservation policies. <i>Journal of Environmental Psychology</i> , 59, 65–73. [Study 2]
6	Cislak, A., Wojcik, A. D., & Cichocka, A. (2018). Cutting the forest down to save your face: Narcissistic national identification predicts support for anti-conservation policies. <i>Journal of Environmental Psychology</i> , 59, 65–73. [Study 3]
7	Dietsch, A. M., Teel, T. L., & Manfredo, M. J. (2016). Social values and biodiversity conservation in a dynamic world. <i>Conservation Biology</i> , 30(6), 1212–1221.
8	Faccioli, M., Czajkowski, M., Glenk, K., & Martin-Ortega, J. (2020). Environmental attitudes and place identity as determinants of preferences for ecosystem services. <i>Ecological Economics</i> , 174, 106600.
9	Greenspan, E., Giordano, A. J., Nielsen, C. K., Sun, N. C.-M., & Pei, K. J.-C. (2020). Evaluating Support for Clouded Leopard Reintroduction in Taiwan: Insights from Surveys of Indigenous and Urban Communities. <i>Human Ecology</i> , 48(6), 733–747. [Urban sample study]
10	Greenspan, E., Giordano, A. J., Nielsen, C. K., Sun, N. C.-M., & Pei, K. J.-C. (2020). Evaluating Support for Clouded Leopard Reintroduction in Taiwan: Insights from Surveys of Indigenous and Urban Communities. <i>Human Ecology</i> , 48(6), 733–747. [Rural sample study]
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