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# Understanding relational values in cultural landscapes in Romania and Germany

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## Abstract

1. Relational values recently emerged as a concept to comprehensively understand and communicate the many values of nature. Relational values can be defined as preferences and principles about human–nature relationships and focus both on human–nature connections and well as human–human connections.
2. Here, drawing on 819 face-to-face questionnaires, we analysed relational, intrinsic and instrumental values across a total of six agricultural landscapes in Transylvania (Romania) and Lower Saxony (Germany). The landscapes described a gradient of land use intensity, within and across the countries.
3. Our results suggest a bundling of values into four groups: those concerned with individual cognition (including intrinsic values), those that focus on nature as a place for social interaction and relaxation, those that capture cultural identity and spiritual values and one bundle that only includes instrumental values.
4. These different values, in turn, were strongly related to (a) respondents' attitudes towards environmental conservation and the (b) frequency with which respondents used nature as a resource.
5. Instrumental values have the tendency to be inversely related to relational values and were found to increase with the land use intensity of the focal landscapes.

KEYWORDS

agricultural intensification, human–nature connections, land use change, leverage points, place attachment, sustainability

## 1 | INTRODUCTION

In environmental conservation, academics and practitioners articulate a wide range of values to convey attributes of nature to decision-makers. The diversity regarding theoretical conceptualisations related to values is high (Horcea-Milcu et al., 2019)—from individual, shared or social values to monetary values, or held and assigned values, as well as intrinsic or instrumental values (Dietz et al., 2005; Kenter et al., 2015; Rawluk et al., 2018). One debate stemming from this diversity is between the acknowledgement of intrinsic and instrumental values (Tallis & Lubchenco, 2014). To bridge intrinsic and instrumental values of nature, a new framing has emerged—relational values (Muraca, 2011). Relational values can be defined as preferences and principles about human–nature relationships (Chan

et al., 2016) and add to the vast body of research into related concepts such as sense of place (Brehm et al., 2013; Trentelman, 2009) or landscape (Barthel et al., 2013; ESF, 2010). This novel framing emphasises the relationships between people and nature, as well as environmentally mediated social relationships (Chan et al., 2016) and ways of living a meaningful, ethically responsible and satisfying life (Himes & Muraca, 2018).

The concept of relational values has facilitated growing recognition that landscape change influences human–nature relationships as well as human–human relationships (Chan et al., 2016; Sheremata, 2018). Rapid and intensive land use change, in particular, may be associated with the erosion of both types of relationships (Riechers et al., 2020). Focusing on the interlinked social–ecological dimensions of landscape change, in turn, could help to combat inequality regarding access to nature and its benefits (Berbés-Blázquez et al., 2016; Scoones et al., 2020), could counteract disconnection from nature (Miller, 2005; Pyle, 2003) and may also foster conservation and restoration initiatives (Bremer et al., 2018; Skubel et al., 2019).

Despite the relevance of relational values for guiding policy-making and management towards a more sustainable world (Chan et al., 2018; Sala & Torchio, 2019), empirical research into relational values remains scarce (with few notable exceptions Arias-Arévalo et al., 2017; Chapman et al., 2019; Klain et al., 2017). Especially cross-country quantitative comparisons to examine influencing factors and bundles of relational values are called for (Schulz & Martin-Ortega, 2018), but missing. To fill this gap, we studied six different agricultural landscapes spanning a land use intensity gradient in Transylvania (Romania) and Lower Saxony (Germany; Figure A1). We used a face-to-face questionnaire and surveyed the values of 819 respondents across 52 villages. Based on prior qualitative research (Balázsi et al., 2019; Riechers et al., 2019, 2020) and existing literature (Table 1), we sought to quantitatively (a) understand the perceived importance of various relational values—and their attributes—in contrast to intrinsic and instrumental values (see Table 1 for a list of the value categories and used questionnaire items; Arias-Arévalo et al., 2017; Himes & Muraca, 2018); (b) scrutinise how different landscape types—from less intensively to intensively used—might influence relational values (Riechers, Balázsi,

**TABLE 1** Descriptions of value categories (relational, intrinsic and instrumental), questionnaire items constituting the respective values (assessed on a 6-point Likert scale) and related references

| Value categories | Descriptions and questionnaire items | References |
|---|---|---|
| *Aesthetic* | Recognising the beauty of nature<br>- I think nature is beautiful | Arias-Arévalo et al. (2017); Cooper et al. (2016); Himes and Muraca (2018) |
| *Care* | Feeling of concern or love for aspects in nature, that matter to someone<br>- It makes me angry that humans treat nature so carelessly<br>- I fear that for our children and grandchildren there won't be much unimpaired nature left | Britto dos Santos and Gould (2018); Jax et al. (2018); Klain et al. (2017) |
| *Cultural identity* | Identity of local culture linked to nature<br>- Our landscape is a big part of our culture | Chan et al. (2016) |
| *Concern for nature* | Awareness and concern linked to the natural environment<br>- I am very aware of environmental issues<br>- I think a lot about how my behaviour affects the environment | Topp et al. (2021) |
| *Individual identity* | Personal identity linked to nature<br>- I feel connected to all living things on earth<br>- I think a lot about how much animals have to suffer because of humans<br>- I am not separate from nature, but a part of it<br>- Even if I am in a big city, I notice the nature around me | Chan et al. (2016); Klain et al. (2017); Nisbet et al. (2009) |
| *Recreation* | Nature used for passive and active leisure<br>- In nature, I can relax and recover<br>- I like to move outside and do sports | Arias-Arévalo et al. (2017); Chan et al. (2018) |
| *Sense of place* | Attachment to a landscape or certain places<br>- Nature helps me to feel home<br>- I have many memories with the landscape here | Stenseke (2018); West et al. (2018) |
| *Spiritual* | Mystical or religious feelings stemming from nature<br>- In nature, I have the feeling there exists something mightier than me | De Vos et al. (2018); Nisbet et al. (2009) |
| *Social relations* | People connect with each other while being in nature<br>- I like to meet people in nature or visit events | Britto dos Santos and Gould, (2018); De Vos et al. (2018); Klain et al. (2017) |
| *Intrinsic* | The value of nature is as ends to itself<br>- All animals and plants have a right to live | Arias-Arévalo et al. (2017); Chan et al. (2018) |
| *Instrumental* | The relationship between human and nature is a means to an end<br>- We humans have the right to use nature as we like<br>- Using nature as resource for industry and economy is more important than nature conservation | Arias-Arévalo et al. (2017); Chan et al. (2018) |

Betz, et al., 2020); and lastly (c) examine how aspects such as socio-demographics, use of products from nature and attitudes towards conservation might influence relational values.

## 2 | METHODS

### 2.1 | Focal landscapes

We compared a land use intensity gradient of three landscapes in Transylvania, Romania (Rupea area, Șoarș and Jibert Communes in Brașov County; Turda area, Mihai Viteazu and Moldovenești Communes in Cluj County; and Baraolt area, Brăduț Commune in Covasna County) and three in Lower Saxony, Germany (Bispingen, district Heidekreis; Bakum, district Vechta; and Dornum, district Aurich; Figure A1). In all six focal landscapes, prior research facilitated the contextualisation of the study and the data collection process. Results from the six focal landscapes were compiled to show overall influencing factors and bundles of values (relational, intrinsic and instrumental) across the countries.

The area of Baraolt is a smallholder-dominated cultural landscape with large patches of forests, grasslands and abundant wildlife. Driven by socio-economic and institutional change, land abandonment and intensification have increased, yet changes have been slow in Baraolt to date. The landscape in Turda is flat, crop-dominated and subject to strong urban influences due to its proximity to the cities of Cluj-Napoca and Turda, Câmpia Turzii and Aiud. Following Romania's accession to the EU in 2007, land use intensity has increased and smallholder vegetable cultivation has been increasingly replaced by industrial croplands. The area of Rupea is also a smallholder-dominated cultural landscape with croplands close to villages, while large areas of high natural value farmlands remain in the remote areas. In Rupea, due to socio-political influences during socialism (1947–1989), the local Saxon community emigrated and the area was repopulated by Roma and Romanian citizens.

The landscape in Bispingen (district Heidekreis) is located in the east of Lower Saxony and partly inside the Lueneburger heath nature park (protected under Germany's federal nature conservation act). This has slowed down the landscape change because of restrictions to agricultural intensification and large-scale infrastructure projects. The landscape in Bakum (district Vechta), located in the mid-west of Lower Saxony, has changed substantially over the last 20 years due to agricultural intensification. The region is known for the highest density mass husbandry in Germany (so called 'Pig belt'). Dornum lies in the north-east of Lower Saxony (district Aurich) in the landscape region of Eastern Frisia and is a coastal landscape at the North Sea. The landscape of Dornum is flat, dominated by often intensively used grasslands and a relatively high amount of wind parks to generate renewable energy.

### 2.2 | Data collection

Preparation for our quantitative survey included extensive theoretical and literature studies on relational values and human–nature relationships. Building upon prior empirical work in the region (see e.g. Balázsi et al., 2019; Hartel et al., 2016; Riechers et al., 2019), the questionnaire development included two focus groups with laypersons to improve structure and wording of the questionnaire and a pilot study with $n = 20$. The questionnaire contained parts on (a) utilisation of nature (visiting frequency of natural areas in the vicinity from 'daily' to 'never'; distance travelled to these places from 'up to 1 km' to 'over 10 km', use of different natural products such as water, wood, decorative material from 'always' to 'never'); (b) attitudes towards nature and nature conservation (importance from 'very important' to 'not important' of the conservation of specific natural attributes in the landscape); (c) relational, intrinsic and instrumental values; and (d) socio-demographic information (see Supporting Information S2 for the full questionnaire). In our study, we focused on nine relational values that were seen as important from our prior research, instrumental and intrinsic values. An overview of the values used in this paper and their description can be found in Table 1. Data were collected through face-to-face surveys, within randomly chosen villages within the focal landscapes. We used proportionate sampling based on the population density of the villages in the focal landscapes. Within the villages, the streets and households were sampled randomly. Surveys were conducted on various days of the week. After a second unsuccessful try, selected households were marked as dropouts. To decrease the dropout rate, we did not randomly select respondents within a given household. All respondents were asked for an oral consent to participate in this study, as a personal signature was deemed to create discomfort and increase dropout rates, especially in Romania. Data were collected between April and July 2017. This resulted in a total sample size of $n = 819$ across 52 villages (Romania $n = 22$ and Germany $n = 30$). The ethical approval of this research was granted by the Leuphana University.

### 2.3 | Data analysis

#### 2.3.1 | Exploratory factor analysis

Our relational value data frame had a size of $N = 819$ observations of 18 variables (see Riechers et al., 2021). We imputed missing data with the method of predictive mean matching. Cronbach's $\alpha$ for these variables was 0.83, while Kaiser-Meyer-Olkin's measure of sampling adequacy was 0.93, well above the recommended value of 0.6, and Bartlett's test of sphericity was significant ($\chi^2(153) = 5{,}583.0$, $p < 0.001$). All of these diagnostics suggest reasonable factorability.

We considered three-, four- and five-factor models using oblimin rotation and a minimum residual factoring method. Associated scree plots and fit statistics indicated that the four-factor model was sufficient (RMSEA = 0.071, Tucker–Lewis index = 0.885). The four factors explained 29%, 7%, 5% and 4% of the variance, respectively, for a total of 45%. We refrained from removing items with factor loadings <0.4 because of our sample size of well above 300 (Stevens, 2002, 395). We provide the full loading matrix in Table 3. We created

composite scores for each factor by adding the scores of the items loading onto each factor for subsequent regression analysis.

### 2.3.2 | Candidate modelling

We modelled the response of the three latent factors to a set of socio-demographic variables using beta regression models (Cribari-Nieto & Zeileis, 2010; Grün et al., 2012) on the latent factor scores that we transformed to the open standard unit interval (0, 1). The transformation applied was the one recommended by Smithson and Verkuilen (2006), so that $y' = (y \times (n - 1) + 0.5)/n$, where $y$ is the data of length $n$. We based the set of candidate models on grouping explanatory variables into three categories: personal characteristics of the respondent ('P': gender, age), nature-based variables ('N': distance travelled, attitude towards conservation, visiting frequency, frequency of use of natural products) and focal landscape ('L'). We constructed the following set of eight candidate models, which may be seen as our hypotheses regarding what variables might explain the latent factor scores observed: Null, N, P, L, N + P, N + L, L + P and N + P + L. We based model selection on AICc values and used the full average method where model averaging was required (Grueber et al., 2011; Nakagawa & Freckleton, 2011). We conducted our analyses using the R programming language (R Core Team, 2019). We present the coefficients of the best-fitting models for each latent factor in Tables 4 and 5 and in the supplementary Tables A1–A4.

## 3 | RESULTS

### 3.1 | Importance of relational values and landscape structure

All relational values and the intrinsic value were somewhat important to the respondents from Romania and Germany, as indicated by the mean score for each relational value being above the midpoint of the response scale (3.0; Table 2). Details on the respondents' socio-demographics can be found in the supplementary material (Box A1). In general, means were higher in Romania than they were in Germany. Respondents generally placed the highest importance on aesthetics (Romania: 6.0 and Germany: 5.7). In Romania, this was followed by the intrinsic value (Romania: 5.9 and Germany: 5.1). In

**TABLE 2** Mean response for each questionnaire item for Romania (RO) and Germany (DE) on a 6-point Likert scale, where 1 = least important and 6 = very important

| Value category | Questionnaire item | Mean RO | Mean DE |
|---|---|---|---|
| Instrumental | Using nature as resource for industry and economy is more important than nature conservation | 2.1 | 2.5 |
| Instrumental | We humans have the right to use nature as we like | 2.4 | 2.6 |
| Recreation | I like to move outside and do sports | 5.1 | 4.4 |
| Individual identity | I feel connected to all living things on earth | 5.3 | 4.6 |
| Individual identity | I think a lot about how much animals have to suffer because of humans | 5.3 | 4.1 |
| Concern for nature | I think a lot about how my behaviour affects the environment | 5.4 | 4.4 |
| Concern for nature | I am very aware of environmental issues | 5.6 | 4.6 |
| Spiritual | In nature I have the feeling there exists something mightier than me | 5.6 | 4.9 |
| Social relations | I like to meet people in nature or visit events | 5.6 | 4.6 |
| Individual identity | Even if I am in a big city, I notice the nature around me | 5.7 | 4.4 |
| Cultural identity | Our landscape is a big part of our culture | 5.7 | 5.2 |
| Care | I fear that for our children and grandchildren there won't be much unimpaired nature left | 5.7 | 4.0 |
| Individual identity | I am not separate from nature, but a part of it | 5.7 | 5.0 |
| Sense of place | Nature helps me to feel home | 5.8 | 5.0 |
| Care | I am angry about that humans treat nature so carefree | 5.8 | 4.8 |
| Recreation | In nature, I can relax and recover | 5.8 | 5.4 |
| Sense of place | I have many memories with the landscape here | 5.8 | 4.9 |
| Intrinsic | All animals and plants have a right to live | 5.9 | 5.1 |
| Aesthetic | I think nature is beautiful | 6.0 | 5.7 |

Germany, the value for relaxation was placed second (Romania: 5.8 and Germany: 5.4). The least important values were the instrumental ones with both questionnaire items below 3.0 in Romania and Germany. Because the value for aesthetics was consistently high in all six focal landscapes, we excluded this variable from further analyses.

## 3.2 | Bundles of relational values

Our exploratory factor analysis resulted in four factors explaining 45% of the total variance in the value categories. Latent factor 1 (29%) comprised all items regarding individual identity, concern for nature, care, as well as one item for sense of place (regarding feeling home in nature) and hence was termed *individual cognition* (the process by which knowledge and understanding is developed in the mind). It also included intrinsic value. We termed latent factor 2 (7%) *nature as a place for social interaction and relaxation*, and it included values related to social relations, recreation and sense of place (having memories in the landscape). Latent factor 3 (5%) embodied *cultural identity and spiritual values*. Latent factor 4 (4%) was concerned only with *instrumental values* (Table 3).

Our results showed clear differences between the six focal landscapes regarding the stated importance of relational and instrumental values (Figure 1). The highest overall importance of the three latent variables concerning relational values was found in the Transylvanian focal landscapes in the Turda area, which has the highest land use intensity of the Transylvanian landscapes, but a relatively even spread of different land use types, and hence, a high level of overall landscape multifunctionality. Second highest ranked the landscape of Rupea, in which extensively used pastures and forest are the dominant land covers. The third highest values were found in the Baraolt area, in which forest and scrub vegetation are the dominant land covers. All German landscapes had lower overall values for the latent factors F1 to F3 than all Transylvanian landscapes. Latent factor F4—instrumental values—was highest in Dornum, in which over 90% of land was used agriculturally and with a high use intensity. Interestingly, Baraolt had the second highest value for latent factor 4, followed by Bakum, an area with a high percentage of agricultural land and high intensification.

**TABLE 3** Factor loadings and communality of variables of relational, intrinsic and instrumental values. Loadings extracted through exploratory factor analysis with oblimin rotation and a minimum residual factoring method. The factors explained 29%, 7%, 5% and 4% (45%) of the variance. $N = 819$; $h^2$ = Communality; F1: individual cognition; F2: nature as a place for social interaction and relaxation; F3: cultural identity and spiritual values; F4: instrumental values

| Value category | Questionnaire item | F1 | F2 | F3 | F4 | $h^2$ |
|---|---|---|---|---|---|---|
| Individual identity | I think a lot about how much animals have to suffer because of humans | 0.838 | | | | 0.59 |
| Concern for nature | I am very aware of environmental issues | 0.714 | | | | 0.59 |
| Care | I am angry about that humans treat nature so carefree | 0.707 | | | | 0.51 |
| Individual identity | I am not separate from nature, but a part of it | 0.693 | | | | 0.62 |
| Individual identity | Even if I am in a big city, I notice the nature around me | 0.687 | | | | 0.47 |
| Concern for nature | I think a lot about how my behaviour affects the environment | 0.661 | | | | 0.53 |
| Care | I fear that for our children and grandchildren there won't be much unimpaired nature left | 0.652 | | | | 0.49 |
| Intrinsic | All animals and plants have a right to live | 0.626 | | | | 0.39 |
| Individual identity | I feel connected to all living things on earth | 0.581 | | | | 0.45 |
| Sense of place | Nature helps me to feel home | 0.544 | | | | 0.46 |
| Recreation | In nature I can relax and recover | | 0.578 | | | 0.41 |
| Social relations | I like to meet people in nature or visit events | | 0.51 | | | 0.35 |
| Sense of place | I have many memories with the landscape here | | 0.493 | | | 0.36 |
| Recreation | I like to move outside and do sports | | 0.361 | | | 0.24 |
| Spiritual | In nature I have the feeling there exists something mightier than me | | | 0.596 | | 0.46 |
| Cultural identity | Our landscape is a big part of our culture | | | 0.455 | | 0.43 |
| Instrumental | We humans have the right to use nature as we like | | | | 0.637 | 0.41 |
| Instrumental | Using nature as resource for industry and economy is more important than nature conservation | | | | 0.425 | 0.27 |

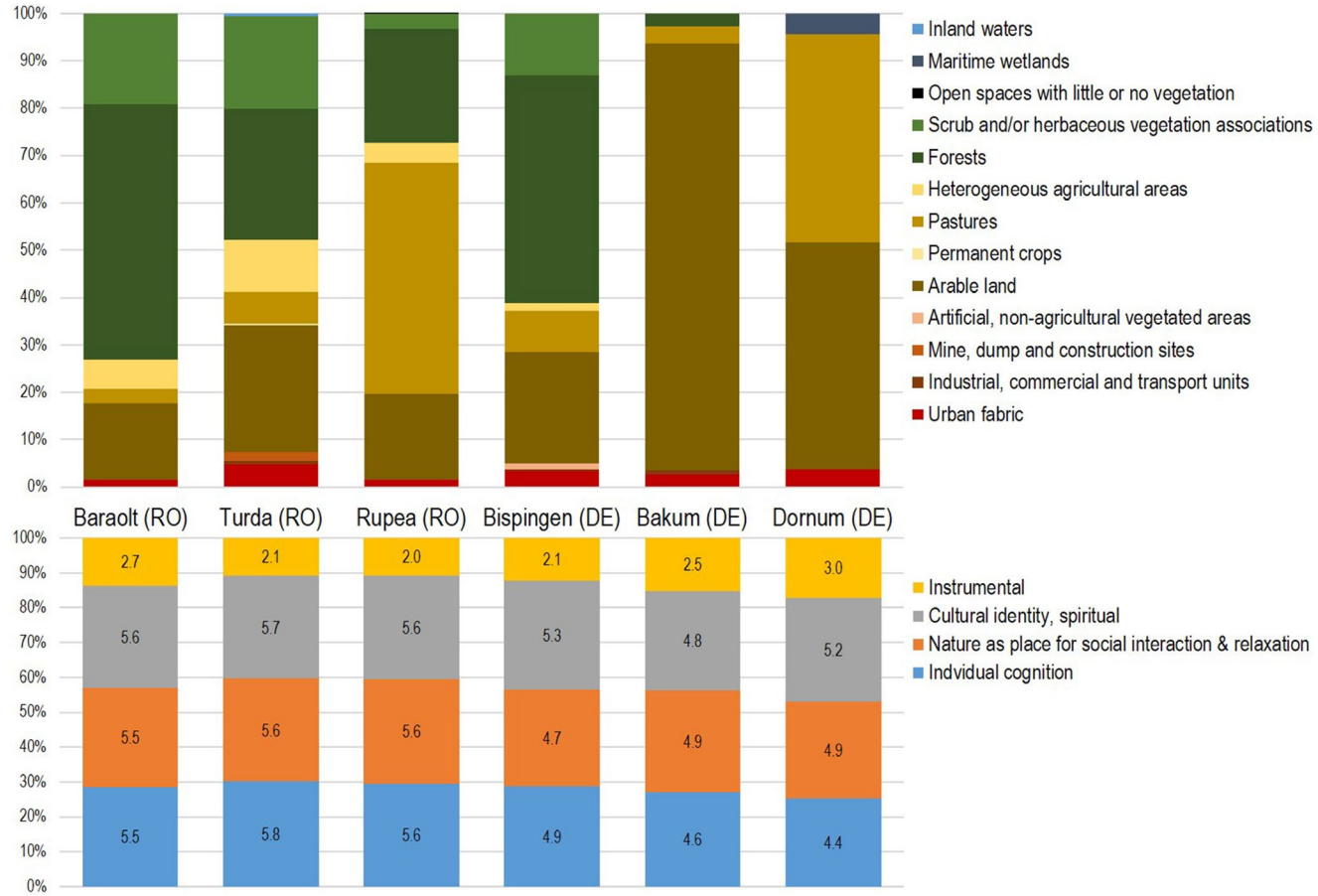


**FIGURE 1** Means of the four latent factors by focal landscapes on CORINE land cover data in percentage of total land area. Range of $n = 819$

### 3.3 | Variables explaining relational values

The four latent factors were examined using regression analysis. For all factors, the confidence set of the best-fitting models always contained a model that included the focal landscape (variable group L), nature-based variables (group N) and personal characteristics of the respondents (group P; Tables A1–A3). These three groups of variables thus appeared to be particularly useful to explain our four latent factors.

Latent factor 1 (*individual cognition*) was most strongly related to a positive attitude towards conservation and a higher frequency of using products from nature in both countries. In Germany, *individual cognition* was further higher among older respondents (Table 4). Latent factor 2 (*nature as a place for social interaction and relaxation*) was only explained by the focal landscape in Romania (Table 5). In Germany, the latent factor was explained by a positive attitude towards conservation and a higher frequency of using products from nature. Latent factor 3 (*cultural identity, spiritual values*) was explained by increasing age of respondents in both countries and again, in Germany also by a positive attitude towards conservation and a higher frequency of using products from nature. Latent factor 4 (*instrumental values*), as shown also in Figure 1, was strongly related to a decreased appreciation towards nature conservation and showed a tendency to increase with higher land use intensity. In Germany, *instrumental values* were further explained by a less frequent use of products from nature.

In the combined model using the full sample for both countries (Table A4), country variance was captured by the focal landscapes playing a major role in explaining *individual cognition*, *nature as a place for social interaction and relaxation* and *instrumental* values—highlighting major difference between the six landscapes, especially between the two countries, as seen also in Figure 1.

The explanatory variables of attitude towards conservation and use of products from nature were included in each model in the German subset, as well as in the full sample. In Romania, these variables had less importance and explained *individual cognition*; only a negative attitude towards conservation was further explaining *instrumental values*. Other variables were generally less useful in explaining relational values. Even though they were included in some of the models supported by the data, distance travelled to nature, visiting frequency and gender consistently had a low effect size and were never statistically significant.

## 4 | DISCUSSION

To discuss our results, we will first focus on individual relational values in their relation to each other. We then discuss the connections

**TABLE 4** Model coefficients for best-fitting models based on the German subsample ($N = 358$). Estimates with a $p$-value of <0.05 are marked with an asterisk and coloured grey

| Predictor | Estimate | *SE* | *p*-value |
|---|---|---|---|
| (a) Individual cognition | | | |
| (Intercept) | −0.594* | 0.225 | 0.008 |
| Distance travelled | −0.049 | 0.033 | 0.131 |
| Conservation attitude | 0.434* | 0.048 | <0.001 |
| Visiting frequency | 0.048 | 0.040 | 0.236 |
| Use of natural products | 0.210* | 0.059 | <0.001 |
| Gender | −0.048 | 0.052 | 0.359 |
| Age | 0.004* | 0.002 | 0.010 |
| Focal landscapes | 0.022 | 0.033 | 0.514 |
| (b) Nature as a place for social… | | | |
| (Intercept) | 0.689* | 0.295 | 0.020 |
| Distance travelled | 0.063 | 0.043 | 0.143 |
| Conservation attitude | 0.186* | 0.065 | 0.004 |
| Visiting frequency | 0.026 | 0.051 | 0.611 |
| Use of natural products | 0.251* | 0.075 | <0.001 |
| Focal landscapes | −0.066 | 0.056 | 0.239 |
| (c) Cultural identity, spiritual | | | |
| (Intercept) | 0.042 | 0.347 | 0.903 |
| Distance travelled | 0.017 | 0.053 | 0.748 |
| Conservation attitude | 0.349* | 0.076 | <0.001 |
| Visiting frequency | 0.103 | 0.066 | 0.115 |
| Use of natural products | 0.358* | 0.097 | <0.001 |
| Gender | −0.148 | 0.084 | 0.080 |
| Age | 0.006* | 0.002 | 0.010 |
| Focal landscapes | −0.019 | 0.042 | 0.651 |
| (d) Instrumental | | | |
| (Intercept) | 2.114* | 0.233 | <0.001 |
| Distance travelled | −0.047 | 0.036 | 0.195 |
| Conservation attitude | −0.355* | 0.055 | <0.001 |
| Visiting frequency | −0.051 | 0.044 | 0.248 |
| Use of natural products | −0.146* | 0.063 | 0.022 |
| Focal landscapes | −0.219* | 0.039 | <0.001 |

**TABLE 5** Model coefficients for best-fitting models based on the Romanian subsample ($N = 461$). Estimates with a $p$-value of <0.05 are marked with an asterisk

| Predictor | Estimate | *SE* | *p*-value |
|---|---|---|---|
| (a) Individual cognition | | | |
| (Intercept) | 1.273* | 0.223 | <0.001 |
| Distance travelled | −0.027 | 0.047 | 0.559 |
| Conservation attitude | 0.251* | 0.045 | <0.001 |
| Visiting frequency | −0.052 | 0.045 | 0.240 |
| Use of natural products | 0.175* | 0.072 | 0.015 |
| (b) Nature as a place for social… | | | |
| (Intercept) | 1.972* | 0.086 | <0.001 |
| Focal landscapes | 0.109* | 0.040 | 0.006 |
| (c) Cultural identity, spiritual | | | |
| (Intercept) | 2.015* | 0.167 | <0.001 |
| Gender | 0.076 | 0.076 | 0.316 |
| Age | 0.005* | 0.002 | 0.026 |
| Focal landscapes | −0.010 | 0.030 | 0.731 |
| (d) Instrumental | | | |
| (Intercept) | 0.808* | 0.293 | 0.006 |
| Distance travelled | −0.084 | 0.061 | 0.168 |
| Conservation attitude | −0.243* | 0.060 | <0.001 |
| Visiting frequency | −0.028 | 0.06 | 0.645 |
| Use of natural products | 0.001 | 0.072 | 0.985 |
| Focal landscapes | −0.171* | 0.052 | 0.001 |

between relational, intrinsic and instrumental values (aim 1). After this, we will go in detail into our further aims of research—the influence of land use intensity (aim 2) and other explanatory variables (aim 3) that may help to understand relational values in cultural landscapes of Romania and Germany.

In general, the consistently most highly valued relational value was aesthetics, emphasising the importance of including landscape aesthetical aspects in planning and decision-making. Further research could disentangle the meaning of 'beauty' for respondents further.

Bundling the items of the questionnaire through an exploratory factor analysis revealed how certain relational values are grouped together. Items regarding individual identity, concern for nature, care, as well as a feeling of home in nature created one bundle, which we termed *individual cognition*, because the focus of these items can be said to be the individual self of the respondents. Another bundle included values concerning social relations, recreation and having memories in the landscape, hence we termed it descriptively *nature as a place for social interaction and relaxation*. Interestingly, two questionnaire items that we initially classified as sense of place (Table 1) are split between those two bundles, showing the importance to further scrutinise this broad category in the future. We suggest that feeling home in nature might be an expression of respondents' individual cognition of themselves and their self-identification, whereas memories from the landscapes might be related to social interactions and moments of relaxation within nature—hence the split between the two bundles. A third bundle included the more collective, socially constructed relational values of *cultural identity and spiritual values*. This may show how the individual self-identification to nature, the social aspects of being in nature and the collective identity formed through culture and religion are also pronounced in the conceptualisation of relational values. This division highlights the importance of the individual sphere and inner motivations as connections to nature (Ives et al., 2020). Moreover, our exploratory factor analysis partly supports the conceptual classification by Chan et al. (2016)

of relational values involving the human collective (latent factors 2 and 3) on the one hand and relational values of a primarily individual nature on the other hand (latent factor 1).

With regard to our first aim, our findings help to understand relational values and how they relate to intrinsic and instrumental values in cultural landscapes in Romania and Germany. On the one hand, relational values and intrinsic values of nature were valued highly by most respondents and bundled together within the latent factor *individual cognition*. These results highlight how respondents' values for nature themselves might be related to their self-identification. Our results might suggest that intrinsic values and relational values are not inherently seen as connected by some respondents, and their differentiation thus deserves further research (Arias-Arévalo et al., 2017; Himes & Muraca, 2018).

Instrumental values, on the other hand, were much less pronounced and valued across all focal landscapes, that is lower than the mid-point of the response scale (3.0). Moreover, they had a tendency to be inversely related to relational and intrinsic values of nature. Our factor analysis clearly showed how instrumental values were understood differently than relational ones, forming a bundle of its own (latent factor 4). Instrumental values seemed to increase with land use intensity, a pattern that was most strongly apparent when comparing landscapes between the two countries (Figure 1; Tables 4 and 5).

Our second aim was to scrutinise how the different landscape types—from less intensive to intensive land use—might influence relational values. Based on prior qualitative research, we hypothesised an erosion of relational values with increasing land use intensity (Riechers, Balázsi, Betz, et al., 2020). Our quantitative results could not clearly confirm this hypothesis. Across the two countries of Romania and Germany and the six focal landscapes, we found that relational values were influenced in part by the landscape, however not in a clear-cut way. Instrumental values indeed seemed to increase with land use intensity, while relational values indeed seemed to decrease when comparing Romania and Germany. Yet, this trend did not hold at the landscape level, and especially not for the area of Baraolt, Romania (Balázsi et al., 2019). This might be due to the distance of the people from the goods and services provided by urban areas, which likely increased the self-sufficiency of inhabitants. In this landscape, biodiversity and land use diversity are still high, while the landscape also supports the needs and demands of the people living there (e.g. local economy based on forestry and animal husbandry). Agriculture and forestry are practiced extensively in the Baraolt area and nature might hence be valued and understood as multifunctional. In areas with higher landscape simplification, be it through intensification (Turda) or abandonment (Rupea), instrumental values seem to more strongly substitute relational ones.

Relational values were substantially higher in Romania than in Germany. This could be because of generally more intensive levels of land use in Germany, as well as fewer people engaged in semi-subsistence agriculture in Germany than in Romania (Balázsi et al., 2019; Hartel et al., 2014). In addition, within their given national context, landscapes with strong sociocultural links and a high degree of multifunctionality appeared to score highly with respect to relational values (Figure 1). Land use intensification is a potentially important issue in the context of relational values in both Germany and Romania. In Germany, the rise of intensive agriculture has already caused tensions and conflicts between different groups of stakeholders, such as smallholder farmers, industrial farmers and environmental conservation groups (Riechers et al., 2019)—who may all hold strong, but potentially contrasting relational values. Due to Romania's current development trajectory (Koranyi & Wittlinger, 2011; Milcu et al., 2014), however, it is possible that relational values will also decrease in Romania in the future (Hanspach et al., 2014).

A better understanding of relational values could be particularly important in a context of landscape change. Especially collective values may be vulnerable to landscape simplification (Riechers, Balázsi, Betz, et al., 2020), such that contrasting values among different clusters of people (e.g. sociocultural backgrounds) could lead to tensions (Riechers et al., 2018). Such tensions may arise because land use change can impact social relationships through creating inequity and social conflicts of the people living within a landscape (Chapman et al., 2019). Most notably, strongly simplified landscapes often provide fewer benefits and only to a small number of privileged actors (Fischer et al., 2017).

Our third aim was to identify other sociocultural factors which may explain relational values. We found that higher levels of relational values and intrinsic values were linked to a positive attitude towards environmental conservation, as well as more frequent use of local natural goods (Admiraal et al., 2017; Knippenberg et al., 2018; van den Born et al., 2017). This could suggest that people with higher relational values are more likely to support conservation agendas (Mattijssen et al., 2020; Topp et al., 2021). Our results showed that the involvement in environmental conservation groups or projects did not have any significant influence on relational values, suggesting that is it not the active involvement per se that is linked to stronger relational values, but rather that strong relational values underpin a positive perception of conservation. The frequent use of natural goods, such as home-grown food and other material connections to nature, was also positively linked to relational values. Interestingly, the frequency of visiting natural places did not have positive impact on relational values. Of the socio-demographic variables tested, only age was significantly related to relational values—with older respondents stating stronger values for *cultural identity and spiritual values* in Romania and Germany, as well as for *individual cognition* in Germany. This may be because older citizens' values were shaped at a time when the landscapes were still relatively more complex and multifunctional; and thus constitutes an example of the shifting baseline syndrome (Britto dos Santos & Gould, 2018; Soga & Gaston, 2018).

When quantifying relational values, much work still needs to be done. To date, no quantitative scale to measure relational values has been sufficiently tested to yield comparable results across different studies. This is a necessary step to be able to convey the importance of relational values without confusion—as one relational value category could be defined very differently across cultures and social

groups. For example, our relational value category of 'sense of place' consisted of two questionnaire items which were later split into two bundles of relational values (latent factors 1 and 2). Showing only the aggregated category of 'sense of place' might hide such nuances. Due to these findings, we decided to focus on the individual questionnaire items, instead of the categories in our further analyses. Especially in the context of dynamic landscape change, an erosion or change in relational values is difficult to assess in a questionnaire. Stating importance of a relational value does not show how prevalent these values still are in the landscape, especially when the landscape is currently experiencing rapid and extreme changes. More research into the quantification of relational values seems necessary to include spatially implicit aspects of these values, while also enabling a broader comparison (Schulz & Martin-Ortega, 2018).

In conclusion, our findings suggest that relational values can be a useful framing to understand how people relate to nature and to one another in different settings. We conducted a first exploration of the effects of rural landscape types in two European countries. Future studies could further disentangle the correlation between relational values and the structural complexity of landscapes. Moreover, further work on the effects of socio-demographic drivers of relational values will be especially useful in the future, as well as work on the conceptual and methodological application of relational values for comparable quantitative research.

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## CONFLICT OF INTEREST

On behalf of all authors, the corresponding author states that there is no conflict of interest.

## AUTHORS' CONTRIBUTIONS

J.F. and M.R. conceived the idea of this paper and all authors contributed critically to the design of the article; M.R. and Á.B. acquired the data; J.-O.E., G.S. and M.R. analysed the data; all authors interpreted the results; M.R. wrote the first draft of the manuscript and all authors contributed critically to subsequent drafts and gave final approval for publication.

## DATA AVAILABILITY STATEMENT

Data deposited in the Dryad Digital Repository https://doi.org/10.5061/dryad.j3tx95xdx (Riechers et al., 2021).

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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