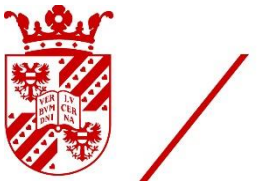

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Too abstract to care about the environment - unravelling the underestimation of biospheric group values

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Abstract

Individuals' perceptions of the extent to which fellow group members care about nature and the environment (i.e., perceived biospheric group values) predict their pro-environmental engagement. However, individuals structurally perceive their group members to endorse biospheric group values less strongly than group members on average self-report, which might demotivate pro-environmental action. Via an online questionnaire (N = 195), the thesis investigated if the perception of biospheric group values is lower, the larger and more remote a group is, (i.e., from residents of the neighbourhood over the city to the country), and if this is due to a higher abstractness, less interpersonal contact and ingroup identification. Moreover, it is tested whether the perception of biospheric group values of the investigated groups (i.e., neighbourhood, city and country) is related to policy support, energy saving behaviours and pro-environmental behaviour. The results indicated that residents of the country are perceived to endorse biospheric values less strongly than residents of the city and neighbourhood. This pattern could not be explained by abstractness, interpersonal contact and ingroup identification. However, abstractness was negatively related to biospheric group values on the city and neighbourhood level, whereas interpersonal contact and ingroup identification was positively associated with biospheric group values on these levels. Moreover, only the perception of biospheric group values on the city level was associated with a higher degree of pro-environmental behaviour and no perception of biospheric group values was linked to climate policy support.

Keywords: biospheric values, abstractness, pro-environmental behaviour, group processes

Word count: 7467

Too abstract to care about the environment? - unravelling the underestimation of biospheric group values

Human actions have led to sustainability challenges such as biodiversity loss, water pollution and climate change (IPCC, 2022; Lewis et al., 2021). These phenomena have major effects on human societies, with a wide range of negative impacts (Rockström et al., 2009). Therefore, mitigation efforts at different levels (i.e., individual, community and society) are required to mitigate these environmental challenges. Specifically, individuals need to adopt various pro-environmental behaviours to reduce negative impacts on the environment and nature (Kollmuss & Agyeman, 2002). Thus, it is essential to gain a thorough understanding of the factors that motivate pro-environmental behaviour worldwide (Wang et al., 2021).

Psychological research has extensively investigated whether and how personal values (i.e., guiding principles and overarching goals people strive for in life) motivate pro-environmental behaviour (e.g., Groot & Steg, 2008; Steg, 2016; Steg et al., 2014). Importantly, individuals who more strongly endorse biospheric values – the extent to which an individual cares about nature and the environment – generally take more pro-environmental behaviours (e.g., Steg, 2016). Whereas traditionally research focused on the motivational influence of individuals' personal biospheric values, recent research indicated that individuals can also be motivated to take pro-environmental action by the values they perceive their group(s) to endorse (Bouman & Steg, 2020; Bouman et al., 2020; Wang et al., 2021).

Yet, individuals tend to underestimate the endorsement of biospheric group values, which may discourage them from taking pro-environmental action (Bouman et al., 2020). Precisely, individuals structurally perceive their group members to endorse biospheric values less strongly than group members on average self-report (Bouman et al., 2020; Hanel et al., 2018). However, still little is known about why and when such underestimations occur and

how this might affect pro-environmental behaviour (Bouman & Steg, 2022; Bouman et al., 2020; Fielding & Hornsey, 2016). In this thesis, I test whether the proposed underestimation is greater for more distant and larger groups. Additionally, I argue that an increased underestimation is due to increased abstractness with less interpersonal contact and less ingroup identification.

Values and pro-environmental behaviour

Values are desirable trans-situational goals that serve as guiding principles in an individual's life (Schwartz, 1992). They are used to evaluate the desirability of certain behaviours and attitudes, tend to be rather abstract, and remain stable over time (Stern, 2000; van der Werff et al., 2014). Individuals endorse all values to a certain degree. However, the more a person prioritises a value (e.g., biospheric value), the more decisive this particular value will be for the person's attitudes and behaviours (e.g., Wang et al., 2021).

Especially, biospheric values are most consistently related to pro-environmental behaviour and attitudes (e.g., Steg et al., 2014). Biospheric values concern caring about the environment and nature for its own stake. As pro-environmental behaviour is inherently beneficial for biospheric values, the relationship between this value and pro-environmental behaviour is particularly robust across studies (Bouman et al., 2020; Groot & Steg, 2008; Wang et al., 2021). For this reason, the thesis focuses on biospheric values.

Biospheric group values and the social identity approach

Recent empirical evidence showed that individuals' pro-environmental behaviours are also motivated by perceived group values; higher-level desirable goals that individuals believe their groups support (Bouman & Steg, 2020; Bouman et al., 2021; Wang et al., 2021). The influence of perceived group values can be explained by the social identity approach, which combines the social identity theory (Tajfel, 1982) and the social categorisation theory

(Turner et al., 1989). The approach describes that group memberships form an integral part of an individual's self-concept (Hornsey, 2008). Further, the theory claims that the self-concept comprises one's personal identity (i.e., individual aspects of the self) and one's social identity (i.e., self-categorisation as members of a social group; Hornsey, 2008; Turner et al., 1989). In general, when a social identity is activated, categorisation tends to assimilate individuals' attitudes, beliefs and behaviours towards the salient content of the social identity (Fielding & Hornsey, 2016; Hornsey, 2008). This content is, among other factors (e.g., ingroup norms and group identity), reflected in perceived group values (Bouman & Steg, 2020; Bouman et al., 2021). For example, the more individuals perceive a salient identity (e.g., a political party to which they belong) as strongly supportive of biospheric values, the more likely they are to take actions which are in line with these biospheric group values.

From these explanations and recent studies, perceived biospheric group values are crucial for supporting pro-environmental action (Bouman et al., 2020; Wang et al., 2021). For example, the more individuals perceive that people in their city support biospheric values, the more likely they are to support or engage in pro-environmental behaviour (Bouman & Steg, 2020).

(Mis-)perception of biospheric group values as a barrier to pro-environmental behaviour

In general, research indicated that many individuals highly endorse biospheric values (Bouman & Steg, 2022; Bouman et al., 2020, 2022; Sargisson et al., 2020; Steg, 2016). Thus, because groups reflect the collection of individuals, a solid group value-base for pro-environmental action exists. However, individuals structurally perceive their group members to endorse biospheric group values less strongly than group members on average self-report (Bouman et al., 2021; Hanel et al., 2018). Similarly, recent evidence showed that such an

underestimation could also be found with regard to climate policy support in the US (Sparkman et al., 2022) and in Germany (Wolf et al., 2023).

According to the reasoning presented above, such an underestimation of biospheric group values has negative implications for individuals' engagement in pro-environmental behaviours. Specifically, individuals might be unlikely to tackle environmental problems if they have the perception that others do not care about the environment (Bouman & Steg, 2020, 2022). This is based on the explanation that individuals internalise the values of the group so that values that are important to the group are also important to the individual when the identity is activated (Fielding & Hornsey, 2016). Furthermore, another explanation for why the underestimation could act as a barrier to pro-environmental behaviour is the impression that their private pro-environmental behaviour is useless, as only collective mitigation behaviour can limit environmental problems like climate change (Bouman & Steg, 2022).

Therefore, it is crucial to understand the factors that influence the perception of biospheric group values and to discover the reasons for the misperception.

Pattern for the underestimation of biospheric group values

Hanel et al. (2018), Bouman et al. (2021) and the Common Cause Foundation (2016) indicated that the values of other people are more selfless than is often assumed. Hanel et al. (2018) reported that selfless values, including biospheric values, were rated higher when individuals were asked about themselves and significantly lower when asked about typical city residents, and even lower when asked about typical inhabitants of their country.

Research suggested that the pattern might be explainable by the motivation to see oneself positively (Brown, 2012). However, empirical evidence from a large-scale survey showed that the self-other differences are unlikely caused by the desire to see oneself positively but by an underestimation of others' selfless values (Common Cause Foundation,

2016). Precisely, the results of two self-desirability bias measures (i.e., tests whether participants respond in a self-favouring manner), namely impression management and self-deceptive enhancement, had no impact on the results of the perception of selfless values (Common Cause Foundation, 2016). Therefore, the thesis focuses on reasons for underestimating others' selfless values.

Hanel et al 's (2018) findings indicated that more remote and larger groups are perceived as less selfless (e.g., from neighbourhood to country). Since biospheric values could also be considered selfless values, a similar pattern will likely be observed for biospheric values (H1).

Reasons for the underestimation

In general, people may underestimate the biospheric values of others because these values are neither publicly shared nor visible (Bouman et al., 2021). Therefore, people might be unaware of the strong endorsement of others' biospheric values since otherwise they would have shown these values more clearly. Remarkably, the different reasons explaining the underestimations (i.e., abstractness, interpersonal contact and ingroup identification), which I will discuss below, may apply more to larger and more remote groups than to smaller and closer groups. Thus, they may explain the findings by Hanel et al. (2018) and provide novel insights in the processes that may lead to misperceptions.

Firstly, smaller, and more local groups might be seen as less abstract and more concrete. Accordingly, the translation of biospheric values in everyday life might be more visible, leading to a more accurate evaluation of the group's biospheric group values that reflect the actual biospheric group values more. In contrast, large and more remote groups might be construed more abstractly, which could make the values less noticeable due to the lack in visibility of translating biospheric values into pro-environmental behaviour. Hence, people might assess the biospheric group values of large and more remote groups as more average,

leading to an underestimation of the generally strong endorsement of biospheric group values. Thus, I hypothesize that abstractness influences the perception of biospheric group values (H2).

Secondly, interpersonal contact tends to decrease as a group becomes larger and more abstract. In larger groups, individuals may only know a small fraction of its members, leading to limited interpersonal contact. This lack of contact can result in an inaccurate perception of biospheric group values, as individuals rely more on indirect information from sources like the media for these groups (Bouman et al., 2021). This indirect information often emphasises negative actions and portrays people as selfish, as people tend to pay more attention to negative information than positive information (Lazarus, 2021). Conversely, in local groups, individuals are more likely to have interpersonal contact with a significant portion of its members, allowing for a more accurate understanding of the values endorsed within the group. Hence, I hypothesize that individuals have less interpersonal contact with more abstract/larger groups, and that less interpersonal contact is associated with weaker perceived biospheric group values (H3).

Thirdly, individuals tend to perceive themselves as being more similar to individuals from closer and more concrete ingroups. This may foster a greater sense of identification with smaller ingroups (Lau, 1989). This phenomenon can be attributed to the fact that people in one's neighbourhood, for example, often share similar socio-economic characteristics that contribute to a perceived similarity. Accordingly, the more one might identify with a group, the more people might perceive them to have similar values and thus a stronger endorsement of biospheric values since these values are generally strongly endorsed. Therefore, I hypothesize that individuals identify more strongly with more concrete and smaller groups and that the stronger identification is related to stronger perceived biospheric group values (H4).

In conclusion, the study will test if the observed pattern by Hanel et al. (2018) can be transferred to biospheric group values, meaning that the biospheric group values are perceived to be lower for larger and more abstract groups. Additionally, it will be examined if the pattern could be explained by the greater concreteness of smaller and more local groups, a stronger identification with these groups and more interpersonal contact. Also, the study will generally investigate if the perceived abstractness, interpersonal contact, and ingroup identification are relevant factors for the perception of group values. Thus, the study will test the following hypotheses (H1-H5 and Figure 1).

H1: Perceived biospheric values are lowest for the country, followed by the city, and thereafter neighbourhood.

H2: Abstractness influences the perception of biospheric group values negatively.

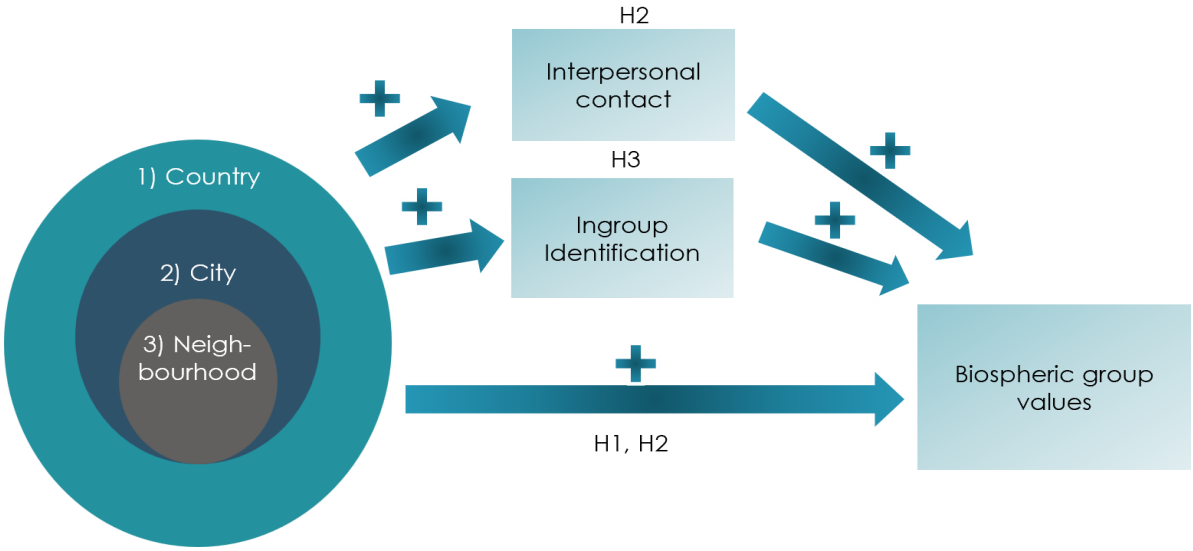
H3: Interpersonal contact mediates the relationship between the group size/abstractness and perceived biospheric group values.

H4: Ingroup identification mediates the relationship between the group size/abstractness and perceived biospheric group values.

H5: The perception of biospheric group values (i.e., of the neighbourhood, city, and country) is positively linked to policy support, energy efficiency behaviour, energy curtailment behaviour and pro-environmental behaviour.

Figure 1

The proposed model with H1-H4



Note. The circle on the left comprises three different groups (i.e., neighbourhood, country, and city). The three levels, respectively the abstractness, serve as IV and interpersonal contact and ingroup identification as mediators. As described, it is expected that from the country level (1) over the city level (2) to the neighbourhood level (3), interpersonal contact and ingroup identification increase and, thus, the perception of biospheric group values. H5 is not presented in the figure.

Methods

Current study with research design

To investigate the hypotheses, I conducted a study in which the respondents were asked about their perceptions of others' values, including biospheric group values. To test whether perceived biospheric values differ between groups, I employed a mixed-factorial design. Firstly, I tested within-subjects (i.e., three levels: neighbourhood, city, and country) if perceived biospheric group values differed for these levels to test H1 ("Perceived biospheric

values are lowest for country, followed by city, and thereafter neighbourhood."). Secondly, I investigated if the patterns of abstractness, interpersonal contact and ingroup identification are in line with my expectations (H2-H4). Thirdly, I also experimentally manipulated the perceived abstractness of the group "city" to test H2 ("Abstractness influences the perception of biospheric group values negatively") from a within as well as between-subjects perspective. Finally, it was investigated if the perception of group values relates to policy support, energy saving behaviours and pro-environmental behaviour.

Sample size and participants

With regard to the sample size, I used G*Power (Faul et al., 2007) to calculate the minimum required sample size for the study. A medium effect size, according to Cohen's d=0.5, was assumed. The t-test-family to compare two independent means (on the city level) with a power of 1-β=0.95 (α=.05) resulted in 176 participants. Due to the exclusion criteria (i.e., participants should fill out all the variables relevant for the main hypotheses), I proposed to have at least 190 participants. The final sample satisfied these requirements.

In total, 195 participants were recruited via convenience sampling and the Sona-System of Groningen (Netherlands) and Lüneburg (Germany). The participants via Sona-System were granted course credit, whereas those people who did not participate via Sona did not get any compensation. The age of the participants varied from 18 to 69 (M_{age} = 24.1, SD_{age} = 10.04). Seven people did not provide their age. Additionally, there were 136 females, 53 males, three participants did not disclose their gender and three identified as "other".

Procedure

The study was realized with Qualtrics. Participants were first presented with an informed consent form, to which they had to comply to start with the actual questionnaire. Thereafter, respondents received questions on perceived group values, ingroup identification and

interpersonal contact for each group (i.e., neighbourhood, city, country; the order varied between conditions) respectively. Furthermore, for each group, the difficulty of evaluating values for the group, the knowledge about group members and the perceived distance were assessed. Finally, participants were asked to answer questions on climate policy support, energy-related behaviours and pro-environmental behaviour.

Manipulation

To manipulate the abstractness of the city group, I randomly allocated the participants to one of two conditions. Precisely, I varied the order of the groups (i.e., neighbourhood, city and country), either beginning with the abstract group (i.e., country) or the more specific group (i.e., neighbourhood). I assumed that the middle group (i.e., city) was seen as more proximal, close and concrete when the more abstract group country was presented first. In contrast, when first presented with the more concrete neighbourhood as a group, the city as a group will appear more distal and abstract. The manipulation was based on contrast effects, a psychological phenomenon in which our perception of something is influenced by the presence or characteristics of other stimuli that occur before. The comparison of these two orders enabled us to examine the influence of abstractness on biospheric group values. Exemplary maps (see Figure B1 in the Appendix) of the neighbourhood, city and country were used to further reinforce the manipulation. Out of the 195 participants, 100 participants received the distal/abstract condition and 95 the proximal/concrete condition.

Measures

Perceived biospheric group values

Participants were presented with eight items which reflected biospheric, altruistic, hedonic and egoistic values, which were based on the E-PVQ (Bouman et al., 2018; see Table A1 in the Appendix for all items). For each item, participants had to indicate how important

they thought the value was for the group (i.e., neighbourhood, city and country) on a 7-point scale from 1 *not important at all* to 7 *of supreme importance*. For each group, two items measured biospheric values ("It is important for residents of your neighbourhood [city; country] to protect the environment and prevent natural resource pollution and "it is important for residents of your neighbourhood [city; country] to respect nature and be in unity with it"), which were used to test the hypotheses. Following Schwartz et al. (2012) procedures, I calculated the mean score over the two biospheric value items for each group, from which I subtracted the mean score of all value items for that group, resulting in a variable that indicated how much importance a group placed on a particular value compared to the other values that were measured. These corrected perceived biospheric group values were used in the analyses.

Abstractness of the groups

For each group (i.e., neighbourhood, city and country), the abstractness with which the groups were perceived was measured. For that, two items, loosely based on items measuring construal-level (e.g., Jones et al., 2017) were used and statements were presented on which participants could state their agreement from 1 *strongly disagree* to 7 *strongly agree*. These items comprised "My neighbourhood (city; country) feels like a vague and unexplicit group to me" and "when I was asked to evaluate the values of residents of my neighbourhood (city; country), it was easy to form a clear and detailed picture of a typical resident of my neighbourhood (city; country)". Eisinga et al. (2013) recommended the use of the Spearman-Brown coefficient instead of Cronbach's alpha for a scale with two items. Thus, I followed the recommendation. The Spearman-Brown coefficient comprised .73 for the neighbourhood, .67 for the city, and .70 for the country. I calculated the mean for each group (see Table 1).

The scale served as the manipulation check in the between-subject design (i.e., the influence of the varying order on the city level) and was used as an independent variable for

the mediation analysis for three regressions on each level (i.e., abstractness on interpersonal contact and ingroup identification on perceived biospheric group values). Besides, the abstractness measure was also used in the within-subjects analysis to test if the groups differ regarding the abstractness with which they are perceived (i.e., in the proposed direction so that from the neighbourhood to the country level, the abstractness increases).

Interpersonal contact and ingroup identification

For the two mediators (i.e., ingroup identification and interpersonal contact), interpersonal contact was measured with one adapted item from Blanchard et al. (2020) per group (i.e., I spend time interacting with most people of my neighbourhood [city; country]), and group identification was measured by one item from Postmes et al. (2013) per group (i.e., I identify with my neighbourhood [city; country]). Again, participants could express their agreement from 1 *strongly disagree* to 7 *strongly agree*. I calculated the mean for each individual which served as mediators (see Table 1).

Policy support

Additionally, policy support to reduce climate change was measured by three items adapted from Tobler et al. (2012). For that scale, participants could indicate their support for different policies (i.e., “Using public money to subsidise renewable energy such as wind and solar power”, “introduction of a bonus-malus system for car taxes depending on the type, efficiency and size of the car”, and “increasing taxes on fossil fuels, such as oil, gas and coal”) on 5-point scale from 1 *strongly against* to 5 *strongly in favour*. The reliability was assessed using Cronbach’s alpha, which yielded a coefficient of .61, indicating moderate reliability. The calculated mean for each individual served as outcome variable to see whether the perception of biospheric group values (i.e., of the neighbourhood, city and country) correlated with climate policy support (see Table A2 in the Appendix).

Energy saving behaviours

Besides, two energy saving behaviours were measured with two items adapted from the European Social Survey (2022). Whereas the first item assessed energy efficiency behaviour (“If you were to buy a large electrical appliance for your home, how likely is it that you would buy one of the most energy efficient ones?”, the second item “in your daily life, how often do you do things to reduce your energy use?”) measured energy curtailment behaviour. Participants could indicate for the first item how likely they are performing the particular behaviour on a 7-point Likert scale ranging from 1 *not at all likely* to 7 *extremely likely*. Furthermore, for the second item, the scaled ranged from 1 *never* to 7 *always* so that they could state how often they do things to reduce the energy use. The items were used separately in the analyses.

Pro-environmental behaviour

Additionally, pro-environmental behaviour was assessed with five items adapted from Wang et al. (2021; e.g., “I encourage others to recycle). Participants could indicate to what extent they agree with the questions on behaviours in their daily lives, ranging from 1 *totally disagree* to 7 *totally agree*. The Cronbach's alpha value indicated with .59 rather a low reliability of the scale. Thus, to increase the Cronbach's alpha value from .59 to .63, one of the items from the pro-environmental behaviour assessment, specifically item three ("I prefer products with less packaging"), was excluded. However, the coefficient still indicated moderate reliability. The mean score was used for the analyses.

Explorative measures

The difficulty of evaluating values for the respective group was assessed with one self-created item (e.g., “I find it difficult to assess the values of residents of my neighbourhood [city; country]”) and the knowledge about group members was measured with two self-created items (“I know the average member of residents of my neighbourhood [city; country]

well" and "I feel familiar with the characteristics of and behaviours of the typical resident in my neighbourhood [city; country."). The scale ranged from 1 *strongly disagree* to 7 *strongly agree*. The Spearman-Brown coefficient was .72 for the neighbourhood, .72 for the city and .58 for the country. Finally, as supposed by Keller et al. (2022), abstractness and psychological distance are interlinked but distinct constructs so that perceived distance was measured with one item separately ("I feel that residents of my neighbourhood [city; country] are distant from myself").

Results

In the following part, first, all within-subjects analyses (i.e., with regard to the three levels: neighbourhood, city and country) are presented. Then, the results of the between-subjects analysis (i.e., the variation of the order: abstractness) are displayed. Finally, I will take a closer look at each level concerning the relationships of the key variables of the study (i.e., follow-up regression analyses).

Within-subjects analyses

Table 1 presents the mean scores, standard deviations and the significant differences between the variables of the groups (i.e., neighbourhood, city and country). To test H1 ("Perceived biospheric values are lowest for the country, followed by the city, and thereafter neighbourhood."), I compared individuals' corrected rating on perceived biospheric group values on each level (i.e., neighbourhood vs city, neighbourhood vs country and city vs country; see Table 1). In support of the first hypothesis, within-subjects analysis[1] showed that,

[1] I also ran a mixed-ANOVA if there was an interaction between condition and presentation order (see Table A4 in the Appendix). The interaction was not significant. Thus, I report the simple pairwise comparisons.

indeed, the perceived biospheric group values of the neighbourhood were significantly higher than on the country level, $t(194) = 6.05$, $p < .001$, $d = 0.4$. Also supportive of the hypothesis, the perceived biospheric group values on the city level were significantly higher than those of the country level, $t(194) = 6.00$, $p < .001$, $d = 0.4$. However, there was no significant difference between the city and the neighbourhood level, $t(194) = 0.42$, $p = .678$. Thus, the first hypothesis was partly supported.

To test if the pattern might be explained by abstractness, interpersonal contact, ingroup identification and distance with which the groups are perceived, knowledge and difficulty, within-subjects comparisons for the six variables were conducted. The pairwise comparisons revealed that the groups (i.e., neighbourhood vs city, neighbourhood vs country and city vs country) did not differ in line with the pattern observed for the perception of biospheric group values (see Table A3 in the Appendix for all pairwise comparisons). Additionally, in some cases, it was even opposed what was assumed before (e.g., with regard to interpersonal contact). Thus, the measured variables could not explain the differences in the perception of biospheric group values between the groups and the differences between the groups did not align with my expectations (see Table 1). Therefore, I did not find support for H2-H4 from the within subjects' perspective.

Table 1

Means and standard deviations of the main variables with pairwise comparisons

	M (*SD*)		
	Neighbourhood	City	Country
Biospheric group values (corrected)	0.08 (0.90) [a]	0.06 (0.94) [a]	-0.35 (0.96) [b]
Biospheric group values (uncorrected)	4.71 (1.30) [a]	4.84 (1.31) [a]	4.27 (1.33) [b]
Abstractness	3.94 (1.51) [a]	3.74 (1.29) [a]	3.86 (1.30) [a]
Interpersonal Contact	3.06 (1.64) [a]	3.81 (1.61) [b]	3.85 (1.75) [b]
Group Identification	3.52 (1.61) [a]	4.30 (1.53) [b]	4.14 (1.55) [b]
Distance	4.13 (1.46) [a]	3.66 (1.38) [b]	3.92 (1.32) [a]
Knowledge	3.73 (1.46) [a]	4.01 (1.22) [b]	3.91 (1.15) [a]
Difficulty	3.99 (1.66) [a]	3.76 (1.42) [a]	3.90 (1.35) [a]

Note. N = 195. The superscript letters ([a], [b]) indicate group differences. For instance, regarding group identification, people identified significantly more with their city and country in comparison to their neighbourhood. For corrected biospheric group values, a higher score reflects a stronger priorisation of biospheric group values in relation to the other three values measured (i.e., hedonic, altruistic, and egoistic).

Between-subjects analysis

To test the manipulation of abstractness on the perception of biospheric group values for the group “city”, I first tested the manipulation via one independent t-test. The independent sample t-test on the manipulation check scale indicated that the manipulation worked so that

residents of the city as a group were perceived as more abstract in the condition where the neighbourhood was presented first (M = 4.16; SD = 1.24) and more concrete where the country was presented first (M = 3.30; SD = 1.20), $t(193) = 5.28$, $p < .001$, $d = 0.71$. Thus, the contrast effect worked as intended.

However, the manipulation did not affect the perception of biospheric group values on the city level since the abstract group (M = 0.06, SD = 0.87) and the concrete group (M = 0.05, SD = 1.02) did not differ significantly from each other, $t(193) = 0.09$, $p = 0.926$. Thus, I did not find support for H2 ("Abstractness influences the perception of biospheric group values negatively") from the between-subjects perspective.

Still, H2-H4 might be supported for each group individually. For instance, the abstractness with which the residents of the city are perceived might lead to less identification with the residents and, therefore, a lower perception of biospheric group values. Thus, I conducted follow-up regression analyses.

Relationship between abstractness, interpersonal contact, ingroup identification, perceived distance, knowledge, difficulty, and the perception of biospheric group values

Although the variables between groups did not differ from each other as expected (i.e., the within subjects' perspective was not in line with my expectations), I tested whether I could find support for the model within the groups (i.e., not to explain the differences between the groups but to investigate relevant factors for the perception of biospheric group values within each group). Thus, the analyses were made for each group separately.

First, I tested the correlations of all predictor and process variables on the perception of biospheric group values (i.e., neighbourhood, city and country) relevant to the main hypotheses (see Table 2). Besides, perceived distance, difficulty of assessing values and knowledge on group members are also included in Table 2 for clarity and simplicity. Correlations between all variables are also presented in Table A4-A6 in the Appendix. For all

groups, the same pattern with regard to the perceived abstractness, interpersonal contact and ingroup identification could be observed (see Table 2). Notably, only for the neighbourhood and for the city level, the correlations were significant. In line with my hypotheses, whereas abstractness was generally negatively correlated with the perception of biospheric group values, interpersonal contact as well as ingroup identification were positively correlated with biospheric group values. Furthermore, whereas the perceived distance was negatively correlated with biospheric group values on the city level, the difficulty of assessing values was negatively correlated with the perception of biospheric group values on the neighbourhood and country level (see Table 2).

Table 2

Bivariate correlations between perceived abstractness, distance, ingroup identification, interpersonal contact, difficulty of evaluating values, knowledge of members of the group and corrected biospheric group values for all groups (i.e., neighbourhood, city, and country)

	Corrected biospheric group values for (neighbourhood)	Corrected biospheric group values (city)	Corrected biospheric group values (country)
Abstractness	-.16*	-.17*	-.13
Interpersonal contact	.22**	.15*	.05
Ingroup identification	.20**	.23**	.11
Perceived distance	-.12	-.21**	-.04
Difficulty	-.19**	-.09	-.21**
Knowledge	.17*	.13	.02

Note. ***$p < .001$, ** $p < .01$, *$p < .05$

Secondly, I conducted a bootstrap analysis[2] (Biesanz et al., 2010) with JASP for each group with the perceived abstractness of the respective group as the independent variable, ingroup identification and interpersonal contact as mediators and corrected perceived biospheric group values as the dependent variable (see Figure 2). Effects were considered statistically significant if the confidence interval did not contain zero.

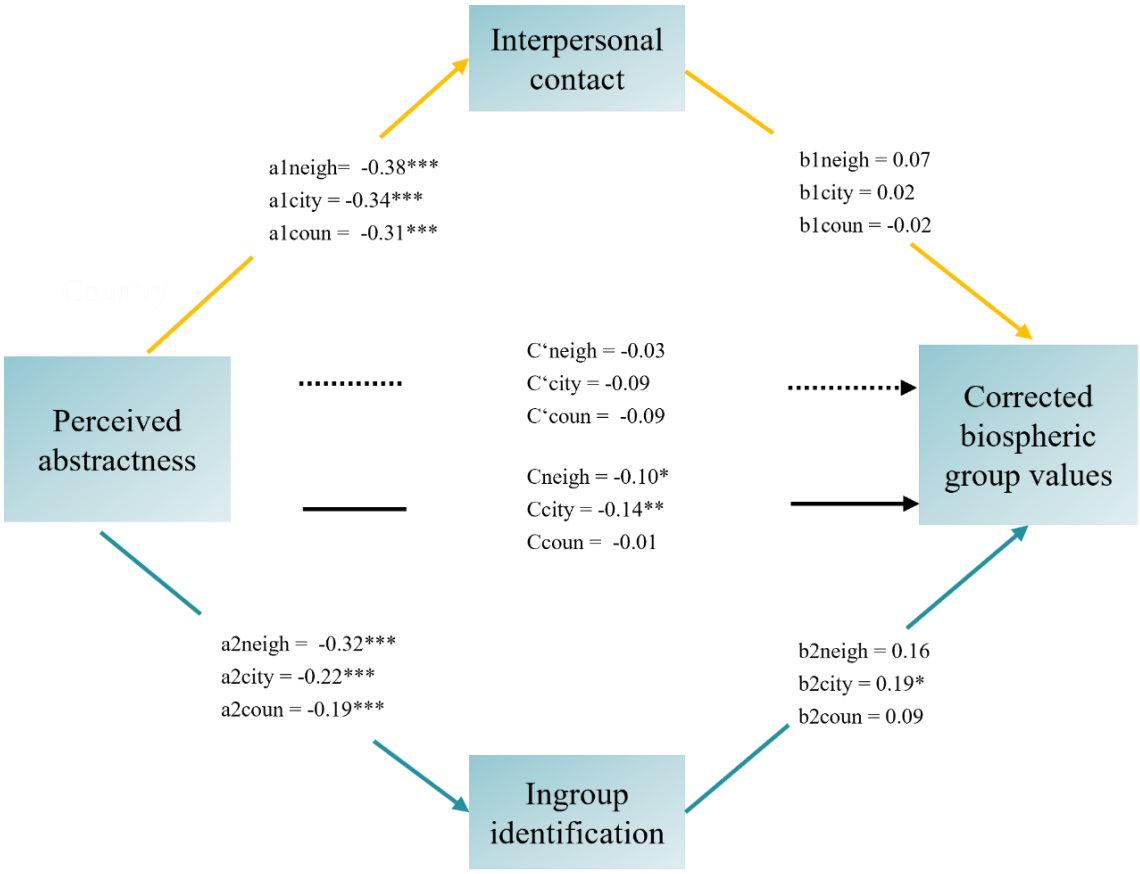
The pathway from abstractness to interpersonal contact and ingroup identification was significant (see Figure B4 for all confidence intervals). However, I found no support for the hypothesised interpersonal contact pathway (i.e., H3) in any group (see the orange lines in Figure 2).

Regarding H4 ("Ingroup identification mediates the relationship between the abstractness and perceived biospheric group values."), there was an indirect effect of abstractness via ingroup identification on the perception of biospheric group values on the city level (*a2*b2* = -0.04, 95 % *CIs* [-0.08, -0.01]). Notably, the direct association between abstractness and perceived biospheric group values became non-significant when controlling for the two mediators, suggesting an indirect only mediation (Zhao et al., 2010). There was no significant indirect effect on the neighbourhood level (*a2*b2* = -0.05, 95 % *CIs* [-0.12, 0.01]) and on the country level (*a2*b2* = -0.02, 95% *CIs* [-0.06, 0.01]).

[2] Bootstrapping was used because it provides a robust approach with correction for bias in indirect effect estimates.

Figure 2

Indirect and direct effects of abstractness of the respective group (i.e., neighbourhood, city, and country) via interpersonal contact and ingroup identification on corrected biospheric group values



Note. ***$p < .001$, ** $p < .01$, *$p < .05$. The standardized coefficients are displayed. "neigh" stands for neighbourhood, "city" for city and "coun" for country. c comprises the regression coefficients of abstractness on corrected biospheric group values (i.e., total effect). c' is the regression coefficient with interpersonal contact and ingroup identification involved (i.e., direct effect).

Interestingly, at the neighbourhood level, the total indirect effect of both mediators (i.e., interpersonal contact and ingroup identification), but not of each mediator separately was significant. This finding, together with medium to high correlations between the two mediators in all groups (see Tables A4-A6 in the Appendix), lead to an assumed problem of

multicollinearity. Thus, when interpersonal contact was not included in the mediation, also on the neighbourhood level (still not on the country level*: a1*b1* = - 0.02, *CIs* [-0.05; 0.01]), ingroup identification mediated the relationship between abstractness and perceived biospheric group values (*a1*b1* = -0.06, *CIs* [-0.10; -0.01]).

Relationship of perceived biospheric group values with policy support, pro-environmental behaviour and energy-saving intentions

Finally, I tested the correlations between the perception of biospheric group values and policy support, energy efficiency behaviour, energy curtailment behaviour and pro-environmental behaviour (see Table 3). Notably, only the perception of biospheric group values of the city was associated significantly with pro-environmental behaviour. Thus, I found very weak support for H5 ("The perception of biospheric group values [i.e., of the neighoourhood, city, and country] is linked to policy support, energy efficiency behaviour, energy curtailment behaviour and pro-environmental behaviour.)"

Table 3

Correlations between the perception of biospheric group values (i.e., neighbourhood, city and country) and policy support energy efficiency behaviour, energy curtailment behaviour and pro-environmental behaviour.

	Policy support	Energy efficiency behaviour	Energy curtailment behaviour	Pro-environmental behaviour
Biospheric group values (neighbourhood)	.03	.07	-.08	.10
Biospheric group values (city)	.01	.12	.12	.16*
Biospheric group values (country)	.00	.01	.11	.11

Note. ***$p < .001$, ** $p < .01$, *$p < .05$

Discussion

The present research examined people's estimations of their perception of biospheric group values on three different levels (i.e., neighbourhood, city and country). Additionally, the study suggested three reasons for the proposed pattern and the general perception of biospheric group values: abstractness, interpersonal contact and ingroup identification.

Theoretical implications

The results provide support in line with H1 and with previous research (Hanel et al., 2018) that the underestimation of biospheric group values is more pronounced for larger and more abstract groups (i.e., country) with a medium effect size compared to smaller and closer groups (i.e., neighbourhood and city). However, there was no significant distinction between the city level and the neighbourhood level in terms of the perceived prioritisation of biospheric group values.

Additionally, the patterns observed by the within-subject analyses of abstractness, interpersonal contact and ingroup identification were not in line with my expectations. Hence, they did not explain the observed differences in perceived biospheric group values. Precisely, although the perception of biospheric group values on the country level differed from the other two levels (i.e., neighbourhood and city), the differences of the other variables were distinct from expected. Thus, from the within-subject analyses, we did not find support for H2-H4.

However, at the same time, I did observe that abstractness, interpersonal contact and ingroup identification were correlated as expected with perceived biospheric group values on the city and neighbourhood level. Put differently, the more abstract, the less interpersonal contact and the less ingroup identification, the lower the biospheric group values are perceived to be. Thus, these variables are still related to people's perceptions of biospheric group values for these groups. Moreover, ingroup identification mediated the relationship

between perceived abstractness and biospheric group values on the city as well as on the neighbourhood level[3]. Thus, for these groups, the findings highlight that abstractness is associated with lower group identification, which, in turn, is related to the perception of lower biospheric group values. Put differently, the more abstract residents of the city or neighbourhood are perceived, the fewer people identify with residents of the city or neighbourhood and the lower the prioritisation of the biospheric group in relation to the other values are perceived.

Interestingly, interpersonal contact did not function as a mediator. This could be the case since the variance of interpersonal contact might be absorbed by ingroup identification. These two constructs may be too strongly related and/or similar constructs. Theoretically, one could also argue that abstractness relates to lower interpersonal contact which then leads to less ingroup identification, and finally, to a lower perception of biospheric group values. The presented study was too underpowered to test for this serial mediation, but further research could further disentangle these relationships. Nevertheless, a correlation between interpersonal contact and the perception of biospheric group values could be found. Put simply, if people think of having more contact with their neighbourhood and city residents, they tend to evaluate the endorsement of biospheric group values as higher.

In general, firstly, the findings with regard to ingroup identification and interpersonal contact support the relevance of utilizing the social identity approach in the context of environmental research (Fielding et al., 2020; Rabinovich et al., 2012). Secondly, the results indicate that the relationships between the variables at the neighbourhood, city level and also country level are similar and go in the same direction. Notably, on the country level, most

[3] As presented in the results, the mediation only is significant if one excludes interpersonal contact as another mediator.

observed relationships are non-significant. Only the difficulty for evaluating values correlates significantly on the country level with perceived biospheric group values. Hence, it needs to be acknowledged that for residents of the country, there might be other factors more important than ingroup identification, interpersonal contact, or abstractness. For this level, also the mediation of abstractness on perceived biospheric group values via ingroup identification was not significant.

Additionally, it is noteworthy that while there was a correlation between abstractness and the perception of biospheric group values at the neighbourhood and city level, the experimental manipulation (i.e., the order: abstractness) did not result in a distinct evaluation of biospheric group values at the city level for the distal/abstract and proximal/abstract conditions (i.e., in the between-subjects condition). This could be attributed to the possibility that the impact of the manipulation was not sufficiently strong to exert an influence, particularly considering that the correlations between perceived abstractness and the perception of biospheric group were relatively small at the neighbourhood and city level.

Finally, whereas past researchers have consistently found that perceived biospheric group values are associated with pro-environmental behaviour (Wang et al., 2021) and energy-saving behaviours (Bouman et al., 2020), the results indicate that only the perception of the residents of the city and not of the neighbourhood and country significantly correlated with pro-environmental behaviour. One could argue that it might depend on the importance of the group. For example, Wang et al (2021) asked about the values of fellow students, a group that is likely to be more influential to the respective respondents than the perception of inhabitants of a whole country. Accordingly, the presented groups in this study were probably not that important to people. Since individuals act in line with groups that are salient and relevant in a certain context, the perception of these biospheric group values might be not related to pro-environmental behaviour (Fielding & Hornsey, 2016). In any case, it can be

concluded that the type of group significantly influences the relationship between perceived biospheric group values and environmental behaviour.

Practical implications

The findings give new insights into the processes causing the underestimation of biospheric group values and, therefore, how one might correct these underestimations. Especially, it becomes evident that still, although we see our neighbours and residents of our city nearly every day, they are perceived as rather abstract. This abstractness (i.e., for the neighbourhood and city) is negatively correlated with the perception of biospheric group values. Therefore, I argue that people need to construe residents concretely to better recognize that biospheric values are widely endorsed. This might be achieved when specific and influential individuals show the translation of biospheric group values into concrete real-world behaviour and when group members are made as vivid, concrete and tangible as possible. Furthermore, similar to ideas by Bouman and Steg (2020), neighbourhoods, city and countries have the opportunity to showcase local instances where residents can actively participate in climate-friendly initiatives to create urban environments that visibly demonstrate residents' pro-environmental behaviours. Such initiatives, but also bottom-up initiatives (Jans, 2021), may emphasize in their communication efforts that the majority cares about the environment and natural resources.

Limitations

There are at least five potential limitations concerning the results of this study. The first limitation concerns the generalisability because of the convenience sample used. Most of the participants were predominantly students, who might have a different perception of biospheric group values on different levels than the general population. This might be due to the fact that most people of the sample live in university cities, in which volunteering and environmental

engagement might be more widespread than in other cities. Thus, the endorsement of biospheric group values on the city level might be higher than it would be for a representative sample. Besides, students often only temporarily live in the respective city, which might result in less nuanced differences between the groups so that, for instance, neighbours might be not that relevant to students since they only have shortly contact with them. However, I see no theoretical reason to believe that the hypothesised and observed relationships between variables cannot be generalised to other populations. Empirical evidence indicated that despite variations in mean scores on measures within the field of environmental psychology across different populations, the relationships between those variables tend to remain consistent (Bhushan et al., 2019).

Secondly, another aspect concerns the sample size, which restricts the informative nature of the current findings. The sample size was calculated by an a priori power analysis, wherein a medium effect size was used as an input parameter. This implies that the power of the study was only adequate for detecting effects that are medium or large in magnitude. As a result, the study was too underpowered to find effects that are smaller. Thus, further studies might find out if a serial mediation of abstractness via interpersonal contact and then via ingroup identification exist and if the significant relationships on the neighbourhood and city level also hold true on the country level.

A third limitation comprises the scales with which the constructs were measured. Precisely, to reduce the length of the questionnaire and, thus, the cognitive load, I often used only one or two items to grasp a construct for each group. About construct validity, it could be the case that the items did not capture all facets of the constructs. Also, it remains the question whether the scales to measure abstractness, interpersonal contact, policy support, pro-environmental behaviour, and energy-saving intentions were reliable since the internal consistency indicated by Cronbach’s alpha, or the Spearman-Brown coefficient was

sometimes low. Additionally, some constructs are very similar and might not be easily distinguishable from each other (e.g., interpersonal contact and ingroup identification). Therefore, I suggest that a similar study should focus on one group, thus, keeping the cognitive load rather low and measuring the constructs more comprehensively and with more items to address this limitation.

A fourth limitation involves the manipulation of the abstractness and perceived distance. As Keller et al. (2022) described, it remains challenging to manipulate the abstractness with which an individual or a group are perceived. It could be the case that the manipulation was not strong enough to exert an effect, although the manipulation check indicated that the manipulation worked.

A fifth limitation concerns the alpha inflation error. When multiple tests are conducted within a single study without adjusting the significance level, the probability of falsely rejecting the null hypothesis increases. Thus, the results need to be interpreted with caution and additional research is required to secure the results.

Directions for future research

I see various important avenues for future research. First, the consistency and robustness of the relationship between perceived biospheric group values and pro-environmental behaviour need to be further tested. Specifically, I suggest finding out which groups (e.g., family or colleagues) are important with regard to the perception of their biospheric values for pro-environmental behaviour. Secondly, it would be interesting to see what would happen if people were aware of their underestimations of the biospheric values of others. Here, also experiments on how to correct these underestimations would help to further disentangle the reasons. For instance, one could experimentally manipulate that most people in the city care about the environment and see whether that can promote pro-environmental behaviour. Thirdly, with regard to the underestimations, although it could be found that

abstractness, ingroup identification and interpersonal contact play a role in the perception of biospheric group values on the individual group levels, these factors cannot explain the differences between the perception of biospheric group values on the neighbourhood/city level vs the country level. Therefore, one other reason might be especially worth investigating. This reason involves that in public and political discussions, there is often a portrayal of individuals as primarily self-centred, and it is emphasized that they have limited concern for the environment. This might especially be true for larger and more remote groups (i.e., country residents). It would be interesting to see if this reason could explain the differences in the perception of biospheric group values on various spatial levels.

Conclusion

In conclusion, abstractness, interpersonal contact and ingroup identification could not explain the differences between the perception that people endorse biospheric values less strongly on the country in comparison to the city and neighbourhood level. However, for the group neighbourhood and city, these variables (i.e., abstractness, interpersonal contact and ingroup identification) were still related to the perception of biospheric group values. Moreover, ingroup identification mediated the relationship of abstractness on perceived biospheric group values on the neighbourhood and city level. Additionally, the results indicated that biospheric group values were not clearly related to different pro-environmental behaviours and climate policy support. Further research needs to disentangle when and how biospheric group values influences pro-environmental behaviour.

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Appendix A

Table A1

Items measuring biospheric group values on three levels (i.e., neighbourhood, city and country)

It is important for residents of your neighbourhood (city; country) …	
Biospheric 1	To protect the environment and prevent natural resource pollution.
Biospheric 2	To respect nature and be in unity with it.
Altruistic 1	To take care of those who are worse off and be helpful to others.
Altruistic 2	That every person has equal opportunities and is treated justly.
Hedonic 1	To do things they enjoy.
Hedonic 2	To have fun and to enjoy life's pleasures.
Egoistic 1	To have control over others' actions and have authority over them.
Egoistic 2	To work hard, be ambitious and to have money and possessions.

Table A2

Standard deviations and means for policy support, energy efficiency behaviour, energy curtailment behaviour and pro-environmental behaviour

	Mean	Standard deviation
Policy support	4.02	0.74
Energy efficiency behaviour	5.54	1.34
Energy curtailment behaviour	4.77	1.19
Pro-environmental behaviour	5.45	0.85

Table A3

Within-subjects comparisons for all variables

	M (SD)			*T*	*p*-values
	Neighbourhood	City	Country		
Abstractness	3.94 (1.51)	3.74 (1.29)	3.86 (1.30)	1.64/0.55/-1.16	.10/.58/.25
Inter. contact	3.06 (1.64)	3.81 (1.61)	3.85 (1.75)	-5.14/-4.80/-0.2	<.001/<.001/.77
Group ident.	3.52 (1.61)	4.30 (1.53)	4.14 (1.55)	-6.17/-4.46/1.1	<.001/<.001/.27
Distance	4.13 (1.46)	3.66 (1.38)	3.92 (1.32)	3.87/1.75/-2.36	<.001/.08/.02
Knowledge	3.73 (1.46)	4.09 (1.22)	3.91 (1.15)	-3.15/-1.39/1.88	.002/.17/.06
Difficulty	3.99 (1.66)	3.76 (1.42)	3.90 (1.35)	1.64/0.69/-1.19	.10/.49/.24

Note. The first numeric values (t and p-values) before the slash refer to the neighbourhood-city comparison, the second values to the neighbourhood-country comparison and the third values to the city-country comparison.

Table A4

Bivariate correlations between the investigated variables on the neighbourhood level

Variable	1	2	3	4	5	6	7
1. Abstractness	—						
2. Distance	.48***	—					
3. Ingroup Identification	-.48***	-.57***	—				
4. Interpersonal Contact	-.58***	-.57***	.63***	—			
5. Difficulty	.65***	.50***	-.43***	-.47***	—		
6. Knowledge	-.76***	-.52***	.65***	.68***	-.55***	—	
7. Biospheric group values	-.16*	-.12	.22**	.20**	-.19**	.17*	—

Note. ***$p < .001$, ** $p < .01$, *$p < .05$

Table A5

Bivariate correlations on the city level

Variable	1	2	3	4	5	6	7
1. Abstractness	—						
2. Distance	.28***	—					
3. Ingroup Identification	-.28***	-.49***	—				
4. Interpersonal Contact	-.44***	-.43***	.43***	—			
5. Difficulty	.55***	.24***	-.17*	-.34***	—		
6. Knowledge	-.65***	-.39***	.52***	.58***	-.47***	—	
7. Corrected biospheric group values	-.17*	-.21**	.23**	.15**	-.09	.13	—

Note. ***$p < 0.001$, ** $p < 0.01$, *$p < 0.05$

Table A6

Bivariate correlations on the country level

Variable	1	2	3	4	5	6	7
1. Abstractness	—						
2. Distance	.23***	—					
3. Ingroup Identification	-.24***	-.41***	—				
4. Interpersonal Contact	-.40***	-.25***	.30***	—			
5. Difficulty	.60***	.25***	-.19**	-.22**	—		
6. Knowledge	-.61***	-.33***	.38***	.46***	-.46***	—	
7. Corrected biospheric group values	-.13	-.04	.11	.05	-.21**	.02	—

Note. ***$p < .001$, ** $p < .01$, *$p < .05$

Appendix B

Figure B1

Visualisation for residents of the neighbourhood

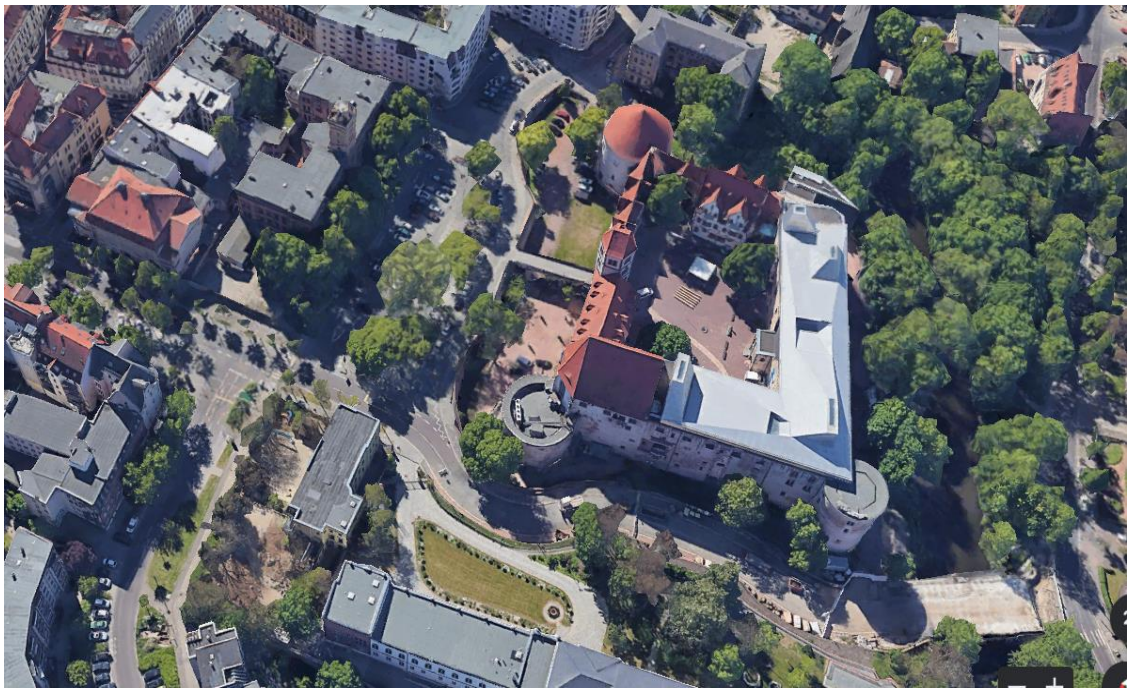


Figure B2

Visualisation for residents of the city

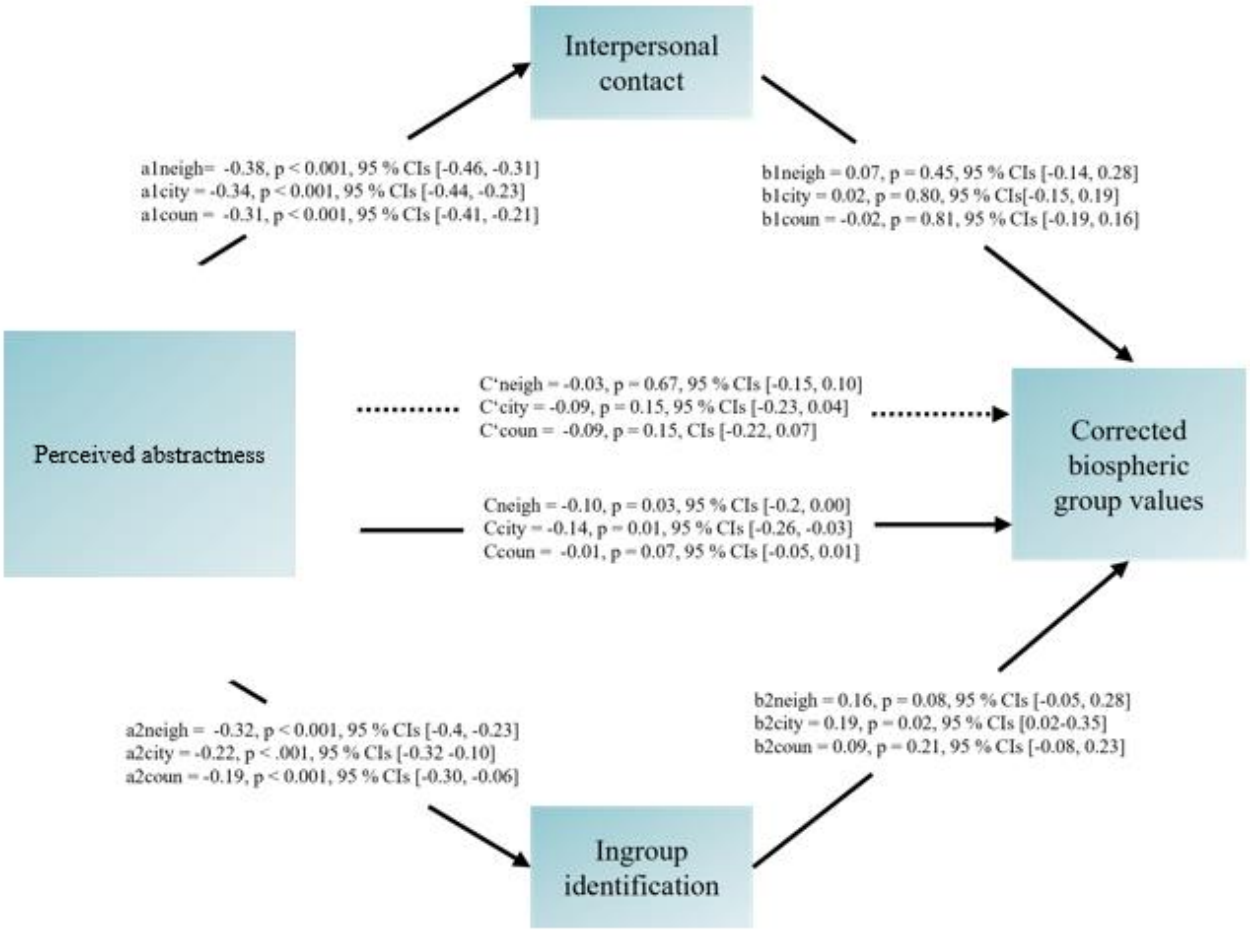
Figure B3

Visualisation for residents of the country

Residents of your country

Figure B4

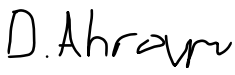
Indirect and direct effects of abstractness of the respective group (i.e., neighbourhood, city, and country) via interpersonal contact and ingroup identification on corrected biospheric group values



Note. ****p* < .001, ** *p* < .01, **p* < .05. Standardized coefficients are displayed. "neigh" stands for neighbourhood, "city" for city and "coun" for country. *c* comprises the regression coefficients of abstractness on corrected biospheric group values. *c'* is the regression coefficient with interpersonal contact and ingroup identification involved

Declaration of Independence

I hereby affirm that the written assignment at hand is my own written work and that I have used no other sources and aids other than those indicated. All passages, which are quoted from publications or paraphrased from these sources, are indicated as such, i.e., cited, attributed.



Dominik Ahrari, 14th of July 2023