To change or not to change? Perceived psychological barriers to individuals’ behavioural changes in favour of biodiversity conservation

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ABSTRACT

Even if there is an increasing public awareness of biodiversity loss, there still is the need to improve individuals’ behaviours in favour of biodiversity conservation, such as composting or buying pollinator-friendly plants. Why do individuals who know about the risks of biodiversity loss, not change their lifestyles to promote biodiversity? The main aim of this paper is to empirically identify the psychological barriers to biodiversity conservation behaviours, with a specific attention to individuals’ perception of the psychological distance of biodiversity loss. To this purpose, 270 individuals were asked to complete a questionnaire. Data demonstrated that six main psychological barriers prevent behavioural change, depending on individuals’ perceived psychological distance as well as on the specific features of the behaviour considered. Our findings constitute a significant theoretical complement to previous research on behavioural change to respond to environmental threats, as it specifically investigates the psychological barriers resulting in citizens’ inaction with regard to biodiversity loss. Furthermore, our paper offers advice for policy-makers, deciding bodies, and associations involved in biodiversity conservation on the cognitive barriers that they might be confronted to when addressing citizens and promoting their engagement in individual and collective actions in favour of the environment.

1. Introduction

Biodiversity loss is publicly recognised as a global environmental challenge (Butchart et al. 2010; Dawson et al. 2011). This has severe negative consequences for ecosystem functions such as climate regulation, soil, and water supply, erosion control, pollination, food production, hence threatening human well-being and possibly human existence (Cardinale et al. 2012; Naeem et al. 2016). This ongoing environmental crisis has received increasing attention in the last decade: protected area coverage increased (Chape et al. 2005), and so does engagement in conservation practices and science (e.g. UNEP 2010). International initiatives also address this crisis, an example being the Strategic Plan for Biodiversity (2011–2020) designed by the United Nations’ Convention for Biological Diversity (CBD). Strategies to enhance and protect biodiversity on private land are implemented by governments and field organisations for instance, conservation agreements and education strategies (Durant et al. 2009; Cooke et al. 2012). For the success of many of these strategies, the cooperation, interest and involvement of local residents is fundamental (Durant et al. 2009; Black et al. 2017), as much as residents’ knowledge and understanding of the importance of biodiversity.

Public awareness of this issue is growing: according to the Special Eurobarometer 436 (2015), six out of 10 Europeans participating feels personally affected by biodiversity loss, and almost three quarters consider that humans have a responsibility to protect nature and stop biodiversity loss. The number of people aware of the notion of biodiversity increased by 9% from 2007 to 2013, and in 2015, at least eight out of 10 Europeans were worried about biodiversity loss.

Few studies have investigated the non-economic factors influencing biodiversity conservation, such as individuals’ or community attitudes towards conservation (Holmes 2003), subjective and social norms (Seeland et al. 2002; Zubair and Garforth 2006), moral responsibility (Goddard et al. 2013) and past experience (Prokop et al. 2008).

Despite this increased awareness and engagement, overexploitation (Rosser and Mainka 2002), habitat loss (Brooks et al. 2002), invasive species (Blackburn et al. 2004; Clavero and García-Berthou 2005) and increasingly, climate change (Parmesan 2006; Carpenter et al. 2008), continue to cause species extinctions (Schipper et al. 2008; Sodhi et al. 2008). Insect declines and loss of pollinators, for instance, remain of particular global concern (IPBES 2016; Hallmann et al. 2017; Harvey et al. 2020).

Data from a more recent Eurobarometer (Special Eurobarometer 501 2019) show that the majority of Europeans (94%) think that protecting the environment...
is important to them. However, only 42% declared to buy local products (e.g. 52% in France, 31% in Italy, 36% in Spain), 22% declared to buy products with an environmental label (e.g. 27% in France, 13% in Italy, 12% in Spain), 27% declared to use an environmentally friendly way for travelling (e.g. 30% in France, 19% in Italy, 28% in Spain), and 21% declared to have used the car less in the past 6 months (e.g. 26% in France, 12% in Italy, 19% in Spain). This data demonstrates the existence of a gap between individuals’ awareness of the importance of environmental protection, and their actual engagement in environmentally friendly behaviours.

If empirical studies have already identified the psychological levers and motives pushing individuals to change their lifestyle and adopt biodiversity conservation behaviours (e.g. Bamberg 2013; Prévot et al. 2018; Levé et al. 2019), it is also important to understand the psychological barriers preventing individuals from changing their behaviour. To efficiently guide applied programs of environmental education and communication, it is important to know not only the levers to push on, but also the barriers to fight against. It is thus fundamental to identify the psychological rationales that bring individuals to justify their inaction and the maintenance of their current behaviours even if harmful for the environment. Often the barriers and levers of behaviours reducing biodiversity loss are considered and investigates at the same time (e.g. Goddard et al. 2013; Stoll-Kleemann and Schmidt 2017; Maseyk et al. 2021). The novelty of the present paper is that it exclusively focuses on the barriers, implementing a comprehensive survey used before with regard to climate change inaction (Lacroix et al. 2019), and integrating a new fundamental dimension of risk perception as a separate barrier: psychological distance.

The main aim of the present study is thus to identify the psychological barriers that prevent individuals to develop the intention to change their behaviours to contribute to biodiversity conservation (e.g. adopting biodiversity-friendly garden management practices, buying local, using a compost, planting native species of vegetation), with a particular interest into risk perception as well as behavioural intentions, as the first is a strong predictor of individuals’ motivation to react to a threat (Witte 1992) and the second is strongly connected to behavioural change (Ajzen 1991, 2011; Hemayatkah Jahromi et al. 2017; Alzubaidi et al. 2021).

Previous work has already identified the psychological barriers to climate change mitigation and adaptation behaviours (Gifford 2011, 2013). However, it is important to consider that climate change and biodiversity loss are two related but different issues, which are not threatened in the same way by society and are not perceived in the same way by individuals. For instance, the two environmental issues have different places in the media, with climate change receiving a much higher attention than biodiversity loss (up to a difference of 8 to 1 in Anglophone journals in 2016; Legagneux et al. 2018). Individuals’ perception of these two environmental issues is also quite different: climate change is a threat individuals are mainly aware of, whereas biodiversity loss is often linked to a diversity of meanings, being poorly understood by the public (Fischer, Bednar-Friedl et al. 2011a; Fischer, Langers et al., 2011b; Levé et al. 2019), or not mentioned when thinking about environmental threats (Skogen et al. 2018). It’s thus fundamental to understand the specific psychological barriers determining individuals’ inaction to conserve biodiversity.

1.1. Psychological barriers to environmental inaction

Why do individuals, who know about environmental issues and risks, still not change their behaviour? In the field of climate change adaptation and mitigation, several studies have proposed and described psychological barriers to climate change mitigation and adaptation behaviours.

Recently, Lacroix et al. (2019), have elaborated the Dragons of Inaction

Psychological Barriers (DIPB) scale, measuring the psychological barriers limiting individuals’ engagement in pro-environmental behaviours. Based on the previous work of Gifford (2011) and Gifford and Chen (2017), five factors have been identified as the five dragons of inaction.

The first factor, defined as Change Unnecessary or Ineffective, concerns individuals’ beliefs about the need for behavioural change (including items such as ‘Human are powerless when it comes to saving the earth, so there is no need to change’). This dimension includes the belief in technological solutions to climate change, the feeling of powerlessness, and the denial of the responsibility to react in order to mitigate or adapt to climate change. The second factor, defined as Conflicting Goals and Aspirations, refers to individuals’ perception of behavioural changes as being in conflict with the individual’s own goals and habits (e.g. ‘These issues are important to me but it’s too hard to change my habits’), including the perception of such changes as too expensive or too time-consuming. The third factor, defined as Interpersonal relations, refers to individuals’ fear that pro-environmental behavioural changes would be disapproved and undesirable to their peers, their families, their social networks in general (e.g. ‘I’m worried that my friends would disapprove if I made this change’). The fourth factor, defined as Lacking Knowledge, refers to individuals’ perception that they do not know, or do not have enough
information to know, how to act to mitigate or adapt to climate change (e.g. ‘I’d like to change but I’m not sure where to begin’). Finally, the fifth factor, defined as Tokenism, refers to the individual tendency to consider that they are already making enough efforts to protect the environment (even if they are very small; e.g. ‘The pro-environmental efforts that I currently engage in make further changes unnecessary’).

The present study aims to test whether these five dragons play a role also in individuals’ inaction when it comes to biodiversity loss and conservation.

Moreover, considering the importance of risk perception to motivate, or fail to motivate, people to change (Witte 1992; Bosone et al. 2015), we argue that an additional barrier to action will be the perceived distance of the risks of biodiversity loss.

### 1.2. Psychological distance

Risk perception is the first step of the decision-making process bringing individuals to adopt, or not to adopt, a specific behaviour, as presented in several socio-cognitive models explaining individuals’ decision-making (Prochaska and DiClemente 2005; Schwarzer 2008; Witte 1992).

More precisely, the closer a risk is perceived to be, the more an individual will be motivated to change his behaviours in order to face such a risk. We are referring here to the concept of psychological distance, which refers to people’s perception of the distance or proximity of a specific object (an event, a risk, a behavior ...) on several dimensions: geographic (spatial distance between the event/object and the perceiver), temporal (time between the object/event and the perceiver), social (perceived similarities between the other and the self), and uncertainty (perceived likelihood of an event).

Research has demonstrated that people perceive environmental risks, such as climate change, as a psychologically distant threat (Trope and Liberman 2010; Spence et al. 2011), something that happens in some distant future (temporal distance), far away (geographical distance), and to other people (social distance). This is problematic because it limits individuals’ involvement in mitigation (e.g. adopting low-emission vehicles, energy-saving behaviours, buying products with low GHG emissions during production and transport) as well as adaptation actions (heat protection, flood protection; Dietz and Maddison 2009; Jabeen 2014; Taylor 2014; Stern et al. 2016; Creutzig et al. 2018; Intergovernmental Panel on Climate Change 2018).

It is possible to suppose that psychological distance of environmental risks has a direct influence on the strength of perceived psychological barriers. More precisely, we argue that the more distant biodiversity loss is perceived to be, the strongest will be the psychological barriers to conservation behaviours reported by individuals.

The present study has thus two main research questions:

- **RQ1**: which are the perceived barriers to action predicting individuals’ weak intentions to engage in biodiversity conservation behaviours?
- **RQ2**: how does psychological distance of biodiversity loss influence, and interact with, the psychological barriers to conservation behaviours?

To answer these questions, we carried out at first a qualitative pre-test, to verify whether the five barriers to climate change mitigation also appear in individuals’ free discourse about biodiversity conservation, and then a study to measure the influence of psychological distance and psychological barriers on behavioural intentions. The data that support the findings of the pre-study as well as the main study are available on request from the corresponding author.

The studies were carried out in France with a French sample, the same country where all authors currently live, and where the concern and the research about biodiversity loss is growing.

### 2. Methods

#### 2.1. Pre-test

The main purpose of the qualitative pre-test was to verify that the five barriers are mentioned in individuals’ free discourse about biodiversity loss and conservation. Data was collected during the COVID-19 pandemic, which prevented us to meet with the participants. We created a questionnaire composed of open-ended questions measuring:

1. Whether people knew about biodiversity loss
2. Who they believe is responsible for biodiversity conservation
3. What could be done for biodiversity conservation
4. What are the barriers preventing individuals to adopt such conservation behaviours.

A convenience sample was recruited online, through a post on Facebook groups not concerned directly with biodiversity or environmental protection (e.g. ‘Je participe aux recherches en psychologie’, ‘English speaking mums living in Paris’, and groups of citizens in different cities all over France), during a period of two weeks (in July 2020). Participants voluntarily took part to the study by answering to the questionnaire online. The post presented the general objective of the study and the link to answer to
the questionnaire, plus the email address of the corresponding author in case of further queries. Out of the 30 individuals who participated, 9 had not heard of biodiversity loss before and were thus excluded from the sample. The remaining 21 participants were 5 men and 16 women (and one who preferred not to answer), 21 to 63 years old (M = 42.38, SD = 10.68), living in France. Data was collected and analysed respecting the latest General Data Protection Regulation.

When asked about the responsibility of biodiversity conservation, 77% (N = 16) of the participants considered it as a responsibility for ‘everyone’ in general, 9% (N = 2) considered it as a responsibility for the government, and 9% (N = 2) for the industry, and the remaining person (5%; N = 1) for the individuals in their everyday life.

When asked about the ways to act in order to protect biodiversity, participants were free to mention more than one behaviour. Society efforts were mentioned 4 times (for instance: ‘we need to change mentality’), industry efforts were mentioned 3 times (such as ‘stopping the use of pesticide in agriculture’), and general efforts (such as ‘we need to respect nature’) were mentioned 7 times. Individual efforts were mentioned 15 times, including behaviours such as eating local and seasonal food, recycling better, using second-hand clothes and buying plants supporting pollinators.

When asked about what could be the issues preventing people from changing their behaviour in order to support biodiversity, all the participants mentioned more than one barrier clearly relating to the five factors identified by Lacroix et al. (2019), presented in Table 1. The coding of the answers was the result of the harmonisation of the separate evaluations made by two different judges (with a native understanding of the language used by the participants), researchers in social psychology.

Interestingly, psychological distance was also mentioned 3 times (for instance, ‘People are not concerned enough’ or ‘They think it’s a problem far away in the future’). These results allowed us to identify the DIPM items as appropriate to measure individuals’ barriers in the questionnaire used for the following study.

### 2.2. The study

#### 2.2.1. Participants and procedure

Two hundred and ninety-two participants were recruited online, through a post on Facebook social groups not concerned directly with biodiversity or environmental protection (e.g. ‘Je participe aux recherches en psychologie’, ‘English speaking mums living in Paris’, and groups of citizens in different cities all over France) over a period of two months (August-September 2020). The post was the same one of the pre-study. 22 participants had not heard of ‘biodiversity loss’ before, and were thus excluded from the analyses. The remaining 270 participants were 35.6% men and 64.4% women, 20–71 years old (M = 42.39, SD = 13.09), living in France. An additional personal characteristic we measured to control for its possible parasite influence was participants’ level of experience with biodiversity. Recent research demonstrates that individuals who have regular experiences with nature are more likely to engage in biodiversity conservation behaviours than individuals who do not have regular experiences with nature (Prévot et al. 2018). In particular, the quality of the knowledge individuals had about biodiversity was higher for people who had experiences with nature that involved an explicit attention to biodiversity (such as being a part of an environmental organisation) than for people who had experiences with nature that did not involve such explicit attention. Since the quality of individuals’ knowledge about environmental issues has an impact on their attitudes and behaviours (Fielding and Head 2012; Levine and Strube 2012; Gifford and Nilsson 2014), we decided to measure the type of experience participants had of biodiversity, to control for a possible influence of this variable. We thus asked participants whether they worked or studied in a field of environmental science, and whether they took part to an association for the protection of biodiversity or the environment in general. Anyone who answered ‘yes’ to either one of these questions was considered as ‘experienced’. Twenty-eight percent of participants (N = 76) were categorized as ‘experienced’.

Participants voluntarily completed a questionnaire, and at the end gave their agreement for the use of

### Table 1. Verbatim of the five psychological barriers mentioned by the pre-test participants.

| Barrier | Frequency | Examples |
|---------|-----------|----------|
| 1 – Change unnecessary/ineffective | 5 | ‘People think their actions are too little to make a difference’ |
| 2 – Conflicting goals and aspirations | 10 | ‘It’s difficult to change for some’, ‘…the force of habit’ |
| 3 – Interpersonal relations | 4 | ‘We are in a consumer society, to be cool you have to show that you can buy pineapples and bananas’ |
| 4 – Lacking knowledge | 10 | ‘We don’t have enough information about what should be done’ |
| 5 – Tokenism | 5 | ‘…for others, they think they have done enough’ |
their data; they were then debriefed about the objective of the study.

2.2.2. Measures
The questionnaire included the following measures:

- **Psychological distance** was measured with a scale of 7 items (α = .65; originally 8 items, one item did not result as correlated with the others and was finally not included in the scale), adapted from the scale of climate change psychological distance (Spence et al. 2012): participants rated their agreement with the items (e.g. ‘Biodiversity loss will affect people that I know’) on a scale from 1 (Not at all) to 5 (Completely).

- **Behavioural intention**: the questionnaire included items measuring the intention of participants to engage in several behaviours supporting biodiversity; individuals had to rate from 1 (Not at all) to 5 (Completely) how much they intended, in the near future, to: buy organic, local and seasonal food, buy plants supporting pollinators, start a compost and use sustainable modes of transportation. These behaviours were chosen on the basis of their impact on biodiversity conservation. Buying organic, local and seasonal food has a positive impact because: organic agriculture favors biodiversity in rural areas (Winqvist et al. 2012), globally sourced food has biodiversity and sustainability issues (Macdiarmid 2014; Gregg et al. 2020), and growing fruits outside of their natural growing seasons can have adverse effects on both climate and the environment (Tobler et al. 2011). Buying plants supporting native pollinators would contribute to the conservation of Pollinator insects, which are important because they contribute substantially to the global economy and food availability (Klein et al. 2007; Gallai et al. 2009; Campbell et al. 2017). The effects of composting are both local, as it reduces the use of chemical products and/or provides habitats for biodiversity in gardens (Gaston 2005), and global as it reduces domestic waste quantities (Cox et al. 2010). Finally, switching from the use of individual cars to the use of alternative environmentally friendly modes of transportation (public transport, cycling …) would help reducing air pollution, which affects ecosystems and biodiversity (Lovett et al. 2009; Xia et al. 2015). Indeed, vehicular transport produces about 70% of environmental pollution since exhaust fumes from motors are a source of several pollutants (CO, NO₂, VOC, and PM) (Xia et al. 2015; Sofia et al. 2020): in 2010, all modes of transport produced 24.3% of total greenhouse gases emissions (GHG) of EU-27. Road transport accounts for 72.1% of these emissions.

- **Barriers to biodiversity conservation** were measured by a scale of 24 items (asking individuals to rate their agreement from 1 – Not at all to 5 – Completely), adapted from the DIPB scale (Lacroix et al. 2019), which were then analysed through an exploratory factor analysis (EFA) and resulted in 6 factors (cfr. Results). Translation was ensured with two different translators, the first one translated the original English items into French ones, the second one translated the French version back to English. Following the procedure used by the Lacroix and colleagues (idem), participants were asked at first to think about specific biodiversity conservation behaviours, and then to respond to the questions about the psychological barriers when thinking of adopting such behaviours.

The questionnaire ended by asking participants about their age and gender, and whether they had experiences with an explicit attention to biodiversity (either at their work or because they were part of a pro-environmental association). The data was analysed using SPSS 19.

3. Results

3.1. Psychological barriers to biodiversity conservation
Six factors emerged from the EFA carried out on the 24 items measuring psychological barriers to biodiversity conservation, accounting for 63.3% of the variance in the dataset.

The factors are presented in Table 2, five of them correspond to factors emerged in the work of Lacroix et al. (2019), with the same items loaded in the factors, and were then named in the same way. However, two items loaded into a new sixth factor corresponding to individuals’ tendency to attribute the responsibility of biodiversity conservation to external bodies (e.g. the government), and was thus named External Attribution.

3.2. The link between psychological distance and psychological barriers
Six regression analyses were conducted to analyse the influence of Psychological Distance on the six factorial scores. Psychological Distance had a significant effect on the barriers Change Unnecessary/Ineffective ($β = .49$, $p < .001$; 95%CI = [.57; .87], $r^2 = .22$), Lacking knowledge ($β = .14$, $p < .05$; 95%CI = [.01; .39], $r^2 = .02$), Conflicting goals ($β = .17$, $p < .005$; 95% CI = [.05; .38], $r^2 = .22$), and External Attribution ($β = -.21$, $p < .001$; 95%CI = [−.43; −.12], $r^2 = .04$). The more individuals perceived biodiversity loss as a distant threat, the stronger they believed the change to be unnecessary and conflicting, and they reported to not know how to react to it. Interestingly, the more they
perceived biodiversity loss as a proximate threat, the more they tended to attribute the responsibility for conservation to the government.

Age had a significant effect on the barriers Conflicting Goals, Interpersonal Relations and External Attribution. More precisely, the younger participants were, the stronger they perceived that the behavioural changes would be in conflict with their goals, that they would be negatively perceived by their social environment, and that they were the responsibility of the government.

Gender had a significant effect on the barriers Change Unnecessary/Ineffective and Conflicting Goals. More precisely, women perceived the changes as less unnecessary (M = −0.16; ET = .55) and less conflicting (M = −0.14; SD = .74) than men (Change Unnecessary/Ineffective: M = 0.29; SD = 1.27; Conflicting Goals: M = 0.28; SD = .99).

3.3. Predicting behavioural intentions

A MANOVA was conducted to examine the influence of Psychological Distance and the six Psychological Barriers (included in the model as covariates) on individuals’ intentions to engage in biodiversity conservation behaviours, excluding the intention to start composting which was analysed separately. The influence on individuals’ intention to start composting was analysed separately, because we excluded from the analyses all individuals who already have a compost (N = 117), which reduced our sample to N = 147. Experience, Age and Gender were included in the analyses.

Results are reported in Table 3.

Psychological distance had a significant effect on participants intention to buy organic products and use eco-responsible transportation modes: the more participants perceived biodiversity loss to be a close, proximal threat, the more they were willing to adopt these changes.

The psychological barriers Change Unnecessary/Ineffective and Conflicting Goals had a significant effect on participants’ intention to buy local, organic and seasonal food, as well as use eco-responsible ways of transportation. More precisely, the more individuals perceived the behavioural changes to be unnecessary and in conflict with their goals and aspirations, the less they were willing to change. The
Table 3. MANOVA on behavioural intentions: F values and effect size of the influence of psychological distance and of the six barriers on each behavioural intention in the main study, while controlling for the possible parasite effect of experience, age and gender.

|                          | Buy organic | Buy local and seasonal | Plants for pollinators | Sustainable transportation |
|--------------------------|-------------|------------------------|-------------------------|----------------------------|
|                          | F           | Eta-squared            | F                       | Eta-squared                |
| Psychological distance   | 7.4*        | .03                    | 2.52                    | .01                        | 3.24                      | .01                        | 3.59*                    | .01                        |
| Change unnecessary/ineffective | 9.21**     | .04                    | 18.28***                | .07                        | 7.6                       | .003                       | 4.95*                    | .02                        |
| Lacking knowledge        | 34          | .001                   | .05                     | .001                       | 1.09                      | .004                       | 5.57*                    | .02                        |
| Conflicting goals        | 10.45***    | .04                    | 34.78***                | .12                        | 14.31***                  | .05                        | 17.84***                 | .07                        |
| Tokenism                 | 4.52*       | .02                    | 2.92                    | .01                        | 1.27                      | .005                       | 6.23*                    | .02                        |
| Interpersonal relations  | 1.28        | .005                   | .57                     | .002                       | 2.64                      | .01                        | 7.89*                    | .03                        |
| External attribution     | 13          | .001                   | .51                     | .002                       | 5.15*                     | .02                        | 1.24                     | .005                       |
| Experience               | 29          | .001                   | 2.16                    | .009                       | .62                       | .002                       | .54                      | .002                       |
| Age                      | 2.46        | .01                    | .72                     | .002                       | 7.56*                     | .03                        | 7.14*                    | .03                        |
| Gender                   | 1.92        | .008                   | 3.49                    | .01                        | 4.44*                     | .02                        | .002                     | .001                       |

*p < .05; ** p < .005; *** p < .001.

psychological barrier Conflicting Goals also had a significant effect on the intention to buy pollinator-friendly plants: the more individuals believe this change to be in conflict with their goals and aspirations, the less they were willing to buy such plants.

Tokenism had a significant effect on buying organic and increasing the use of eco-responsible modes of transportation: the more participants perceived to be already enough involved in the protection of the environment, the less they were willing to adopt these changes.

Lacking Knowledge and Interpersonal Relations only had a significant effect on intention to increase the use of eco-responsible modes of transportation, but in opposite directions: while lacking knowledge inversely correlated to participants’ intention (the more participants reported to not know well enough conservation behaviour, the less they were willing to change), interpersonal relations correlated directly. More precisely, the more participants believed using eco-responsible transportation modes to be negatively considered by their entourage, the more they were willing to increase their use of such transportation modes.

Gender had a significant effect on the intention to buy local and seasonal products, and pollinator-friendly plants: women reported higher intention (buy local and seasonal food: M = 4.69; SD = .59; buying plants: M = 3.86; SD = 1.21) than men (buy local and seasonal food: M = 4.13; SD = 1.16; d = .61; buying plants: M = 3.16; SD = 1.42; d = .53).

Age had a significant effect on the intention to buy pollinator-friendly plants and to increase the use of eco-responsible ways of transportation: the older participants were, the more they were willing to adopt such changes. An ANOVA carried out on the 147 participants who did not have a compost demonstrated that none of these variables had an effect on the intention to start composting (all F < 2).

4. General discussion

The main purpose of the present research was to identify the psychological barriers people perceive to prevent behavioural changes in favour of biodiversity conservation, and how are these connected to the psychological distance of biodiversity loss.

4.1. Different barriers prevent different behaviours

The results demonstrate that six main barriers emerge when thinking about behavioural changes, the first five are the same that prevent climate change mitigation behaviours (Lacroix et al. 2019). Contrary to the work of Lacroix and colleagues, where the items measuring individuals’ tendency to attribute responsibility for climate change mitigation to external bodies were included in the Tokenism dimension, our results demonstrated that such a tendency to external attribution when thinking of biodiversity conservation compose a sixth, independent barrier, which we defined as External Attribution of responsibility to act.

Each one of these dimensions predicted low intention of adopting different behaviours to support biodiversity conservation. This is particularly important for behavioural change interventions, as it suggests which barrier to tackle first in order to effectively promote specific behavioural intentions. Hereafter, we offer an interpretation of possible reasons why different barriers prevent different actions.

Conflicting Goals and Aspiration was the strongest predictor of individuals’ intention to buy organic products, local and seasonal food, to buy plants supporting pollinators, and to use more sustainable transportation modes. This is in line with past research demonstrating that hedonic values influence individuals’ environmental beliefs and behaviours (Steg et al. 2014), as these behaviours all require economical and time efforts. Past research has, for instance, demonstrated that the main barrier to individuals buying green is the perceived price (for a review, see Aschemann-Witzel and Zielke 2017). Lack of time for research, decision-making and purchase is also perceived as a major barrier to buying...
green (Biel et al. 2005; Young et al. 2010). In the same way, travel time and comfort is a major barrier to the use of eco-friendly modes of transportation, such as public transportation or cycling, since individuals’ perceive travelling through these modes to take longer – and be less comfortable – than driving a car (Steg 2005; van Exel and Rietveld 2010).

Change Unnecessary/Ineffective and Tokenism had a significant effect on the intention to change specific food products and transportation choices. This could be due to two things: on one hand, it could be due to the fact that even if individuals understand what biodiversity loss is, they might not understand what are its causes. Knowledge about the causes, and not only the consequences, on an environmental issue is the first step towards public and social changes (Prévot et al. 2018); further research should thus investigate the level of the general public’s knowledge about biodiversity loss and its causes.

On another hand, this result could be linked to the fact that these two actions usually have the features of behavioural habits. Indeed, although many behaviours originate from thinking and considering possible alternatives, individuals do not go through such deliberate decisional processes for actions that are repeated regularly and frequently (Aarts et al. 1998).

When a same behaviour is adopted many times and very often, such as buying specific products or using a specific transportation mode (e.g. driving a car), it can become a habit.

Habitual behaviours are extremely resistant to permanent change (e.g. eating habits), and others are only changed slowly, over decades (Maio et al. 2007), making them resistant even to priming and attitude change (Verplanken and Aarts 1999). It would thus be expected that individuals with strong purchasing and driving habits would be the first to deny the importance of changing such habits, and even deny the threat. Indeed, our data also demonstrate that a high psychological distance too predicts the reticence to adopt these specific behaviours (buying organic and using sustainable transportation modes). It is, however, important to consider that in our study we only measured intention of individuals to change their behavior, and not their habit. Future research could focus on measuring how the strength and type of psychological barriers preventing behavioural change in support of biodiversity conservation vary depending on the strength of specific behavioural habits.

Surprisingly, the more individuals attributed externally the responsibility for biodiversity conservation, the higher was their intention to buy pollinator-friendly plants. This result can be interpreted when considering the recent governmental efforts in France to promote gardening practices supporting biodiversity, such as economic incentives offered by national institutional bodies to individual households to buy plants and composts. Little research has investigated how individuals’ perception of the government and its environmental actions influence individuals’ pro-environmental behaviours. It has been demonstrated, for instance, that the more individuals perceive the government to support individuals’ autonomy, the more they are willing to engage in pro-environmental behaviours (Lavergne et al. 2010). It is possible to suppose that the more individuals believe that action is due to a lack of government engagement in promoting behavioural change, the more they will be willing to adopt behaviours that are clearly supported and promoted by the government. However, in the present study we have not measure individuals’ knowledge of public policies about biodiversity; future research should investigate further how individuals’ perception of the government and the public policies about biodiversity influence individuals’ gardening practices, and more in general biodiversity conservation behaviours.

4.2. Psychological distance influence psychological barriers

As expected, psychological distance had a direct effect on psychological barriers, and more precisely the more individuals perceive biodiversity loss as a distant threat, the more they believe behavioural changes to be unnecessary (‘Change Unnecessary/Ineffective’), to be conflicting with their lifestyle (‘Conflicting Goals and Aspiration’), and the more they affirm to not have enough information about how to react to it (‘Lacking Knowledge’). Psychological distance had an unexpected effect on the barrier External Attribution: the more individuals perceived biodiversity loss as a proximal, near threat, the more they tended to attribute responsibility for biodiversity conservation to external bodies, and more specifically the government. This can be interpreted in light of the theory of cognitive dissonance (Festinger 1957), explaining how when individuals perceive an incoherence between their attitude and their behaviour, this causes a negative arousal of tension and unease. In the case of the present study, the individuals who are aware of the issues caused by biodiversity loss, but who do not change their behaviour in order to support biodiversity, might have felt uncomfortable due to this dissonance, and thus might have been motivated to reduce such unpleasant emotion by adopting a cognitive strategy to resolve such dissonance. To resolve cognitive dissonance, individuals can adopt several strategies (for a review, see McGrath 2017), such as changing their attitude, denying such dissonance or deny their responsibility. Denial of responsibility is indeed an effective way to resolve cognitive dissonance (Gosling et al. 2006), as this last is triggered only when
individuals recognise their responsibility in causing an issue, and their responsibility in fixing it. Several research demonstrated that denial of responsibility is indeed a common cognitive strategy used in order to justify inaction in the face of climate change, and it is usually accompanied by the attribution of the responsibility of the causes of climate change and the responses to mitigate it to the government, the industries, or more in general the ‘others’ (Lorenzoni et al. 2007; Semenza et al. 2008; Lacroix et al. 2019). In the study we carried out, results indeed suggest that individuals tend to attribute responsibility to solve biodiversity loss to external bodies (e.g. the government) especially when they consider biodiversity loss as an important issue, threatening people here and now.

These nonmonotonic effects of psychological distance might also suggest that further research is needed to understand how the intrinsic and instrumental values of nature and the environment could interact with relational values in their effect on individuals’ intentions and behaviours (Chan et al., 2018). Indeed, perceived psychological distance is an element that contributes to an intrinsic motivation to act, which however could not be the only motivational factor: relational values, in the sense of ‘preferences, principles, and virtues associated with relationships, both interpersonal and as articulated by policies and social norms’ (Chan et al., 2018, p. 1462). Future research could thus measure both intrinsic (e.g. perceived risk, psychological distance) and relational values and motives (e.g. connectedness to nature) to act in favour of the environment.

4.3. The influence of intervening variables: experience and gender

In the present study, we decided to control for the possible effect of individuals’ characteristics, and more precisely: the type of experience they had with biodiversity, their age and their gender.

With regard to the experience, we compare ‘experienced’ individuals (N = 76) who have explicit experiences with biodiversity (through their work, or through their involvement in pro-environmental associations), to ‘non-experienced’ individuals (N = 194) who do not have such direct experience. Measured as such, experience did not have a significant effect on any of the dependent variables, psychological barriers or behavioural intentions. This is in contrast with past research demonstrating that the quality of the experience and expertise individuals have with environmental issues also influence their behaviour (Levé et al. 2019). Two possible explanations can be considered: on one hand, it is possible that the way experience was measured in the present study was not accurate enough, as it only took into consideration whether people worked or acted in the field of environmental protection, and not their actual knowledge of the issue, or the strength and frequency of such experience. On the other hand, this result might indeed point to the fact that these types of experiences might not influence individuals’ intentions to change, or the barriers they perceive to them changing. Further studies are needed to clearly investigate whether levels of knowledge, experience and expertise with biodiversity loss and conservation influence individuals’ risk perception, barriers, and behaviours.

Finally, gender differences have emerged in the present study. Men reported to believe the changes to be unnecessary (‘Change Unnecessary/Ineffective’), and conflicting with their lifestyles (‘Conflicting Goals and Aspirations’), more than women. Women also resulted as more willing to buy local products and pollinator-friendly plants than men. These results are in line with past studies demonstrating that women tend to report stronger environmental attitudes, concern and behaviours than men (Guttentag and Wiegman 1993; Zhang 1993; Blocker and Eckberg 1997; Tikka et al. 2000; Luchs and Mooradian 2012; Scannell and Gifford 2013). This gender difference in environmental attitudes and behaviours was also supported across age and across 14 countries in Europe, Latin America and the U.S. (Zelezny et al. 2000). It has been argued that these gender differences could be due to variations in personality traits. For example, more agreeable consumers are more likely to place importance on social and environmental concerns, a personality trait that is prominent among women (Luchs and Mooradian 2012). Similar explanations propose that, compared to males, females have higher levels of socialization to be other-oriented and socially responsible, which may then influence pro-environmental behaviours in general (Zelezny et al. 2000). Altruistic concerns such as health and safety (which can be threatened by a degraded environment) are also more important to women, especially to women with children at home (Davidson and Freudenburg 1996; Dietz et al. 2002). The studies on the influence of gender on pro-environmental engagement focus specifically on household pro-environmental behaviours (Kennedy and Kmec 2018). Future research should thus investigate better how, and which, personality traits determine environmental attitudes and behaviours with regards to biodiversity conservation at an individual, household, or collective level.

One last variable that could have had an influence on our data is the fact that the sample has been recruited through online social networks (Facebook), which is a technique that presents limitations (Kosinski et al. 2015), with regards for instance to the lack of control over the circumstances in which participants respond to the questionnaire as well as
the possible variability in the accountability perceived by participants while answering (Gosling et al. 2004). Further studies should thus include a wider sample of respondents country-wide using a variety of channels for recruitment.

4.4. Theoretical contributions and practical implications

Our findings offer several theoretical contributions, going hand in hand with important practical implications. First, the present study identifies six main barriers to behavioural changes supporting biodiversity loss, contributing to research concerning environmental inaction. In particular, our findings show how two barriers seem particularly involved in biodiversity inaction: the perception of the changes as unnecessary, and the perception of the changes as too difficult and too demanding. This has important potential implications for decision-makers and agencies interested in promoting behavioural changes, as it suggests the barriers that could be taken into consideration, along with the psychological levers, in communication and education programs, and interventions in general, to promote individual actions supporting biodiversity conservation. Moreover, these findings could have implications for environmental public policies and policy-makers, since the acceptance by the local population of public policies determines their effectiveness (Oltra et al. 2021). Knowing the barriers to behavioural change could indeed help policy-makers improve the acceptability of new public policies regulating individuals’ behaviours with regard to their impact on biodiversity.

If the similarities of the different contexts, cultures and societies across Europe suggest that the psychological barriers and levers of action and inaction could be similar across population, it is however important to acknowledge that cultural values and contextual specificities (e.g. national and local public policies) influence citizens’ behaviours (Tam and Milfont 2020). Future research should deepen the understanding of how the influence of the identified psychological barriers can vary across different cultures and socio-political contexts. A second limitation of the present work concerns the fact that it focuses on behavioural intentions rather than actual behaviour. Although vast literature on this subject has demonstrated that intentions are the strongest predictors of behaviour (Ajzen 1991, 2015b), there is empirical evidence concerning the existence of an intention-behaviour gap (e.g. Grimmer and Miles 2017): individuals with strong intentions to act pro-environmentally do not always transform such intentions into actual actions. Taking into consideration the fact that the predictive power of intentions has also been the object of most recent debates (e.g. Sniehotta et al. 2014; Ajzen 2015a), future research should analyse further the actual link between psychological barriers and actual behaviour.

Secondly, the study we presented is the first to analyse the influence of psychological distance of biodiversity loss on the barriers and the intention to adopt conservation behaviours, contributing to the debate about the effectiveness of ‘proximising’ an environmental threat in communication campaigns (Brügger et al. 2016). Communications aiming to persuade individuals to adopt specific behaviours in response to specific threats often focus and emphasize the risks targeted. In the field of health promotion, this has been shown to increase individuals’ threat appraisal (Witte and Allen 2000; Bosone et al. 2015) and involvement (Bosone and Martinez 2017), and thus motivate towards the adoption of behavioural responses to face such threat. However, past research demonstrated that this might not be effective in the promotion of climate change mitigation behaviours. Indeed, it has been argued that presenting climate change as a proximal, near threat, concerning everyone, thus reducing its psychological distance, might not be an effective strategy to promote mitigation behaviours (e.g. Shwom et al. 2008; Spence and Pidgeon 2010; Schüldt et al. 2018; Loy and Spence 2020), and could even have a boomerang effect: if individuals perceive a threat to be too close, and to not have the right tools to face it, they might engage in strategies to reduce the fear generated, such as denying the threat itself (Rogers 1983; Witte and Allen 2000). Although no study has yet analysed the effectiveness of proximising the threat of biodiversity loss in promoting conservation behaviours, the study we presented in this paper seems to indicate that such strategy might increase responsibility denial. Indeed, the more participants perceived biodiversity loss as a proximal threat, the more they attributed the responsibility for resolving it to external bodies. Future research should thus investigate further the influence of reducing the psychological distance of biodiversity loss on individuals’ motivators and barriers to conservation behaviours.

Finally, it is important to consider that the present work focuses on individuals’ intention to engage in individual actions in favour of biodiversity. However, most recent research has stressed the need for changes not only at the level of the individuals, but also at the level of the social system, in order to build a sustainable and eco-responsible society (Bamberg et al. 2018). This also emerges from the results of the research we presented, as on one hand the pre-study results pointed out that while society and industrial efforts are considered as important by individuals, the individual citizens’ actions are most often mentioned. This could suggest that individuals interiorise the responsibility for the change, while
Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Université Gustave Eiffel.

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