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**Causal effect of consideration of future consequences on  
pro-environmental intention**

Bachelor's Thesis

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In Prague on  
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## **Abstract**

Literature shows that future-oriented mindset is positively associated with pro-environmental intention and behavior. However, the experimental evidence that would support the causal effect of time perspective on pro-environmental intention and behavior is largely missing. To test for the causal effect of time perspective on pro-environmental intention, we conducted an experimental study that conceptually replicated and extended the only experimental study that explored the effect of time perspective in the pro-environmental domain (Arnocky et al., 2014, Study 2). Specifically, we performed a pre-registered web-based randomized experiment on a representative sample ( $N = 598$ ) of the Czech adult population in which we manipulated future and immediate time perspectives using prospect-concept priming and measured people's pro-environmental intention. We also studied whether the underlying mechanism is mediated by consideration of future consequences (CFC). We found that prospect-concept priming had no effect on pro-environmental intention in our study and that it did not result in the theoretically expected effect on the consideration of future consequences. We interpret this evidence as suggesting that prospect-concept priming probably has a very small treatment effect that is not sufficient to manipulate people's time perspective in studies like ours. Nevertheless, the exploratory analysis hints that the boundary conditions of prospect-concept priming could be priming task time or participants' attention. However, our finding of the theoretically expected positive association between consideration of future consequences and pro-environmental intention, highlights--once again--that future studies should investigate the potential causal underpinning of this association.

## **Abstrakt**

Literatura ukazuje, že myšlení orientované na budoucnost je pozitivně spojeno s proenvironmentálním záměrem a chováním. Experimentální důkazy, které by potvrdily kauzální vliv časové perspektivy na proenvironmentální záměry a chování, však z velké části chybí. Abychom ověřili kauzální vliv časové perspektivy na proenvironmentální záměr, provedli jsme experimentální studii, která koncepčně replikovala a rozšířila jedinou experimentální studii, která zkoumala vliv časové perspektivy v proenvironmentální oblasti (Arnocky et al., 2014, Studie 2). Konkrétně jsme provedli před-registrovaný webový randomizovaný experiment na reprezentativním vzorku ( $N = 598$ ) české dospělé populace,

v němž jsme manipulovali s budoucí a bezprostřední časovou perspektivou pomocí prospektivně-koncepčního primingu a měřili proenvironmentální záměr lidí. Zkoumali jsme také, zda je základní mechanismus zprostředkovaný časovým zaměřením na budoucí dopady (CFC). Zjistili jsme, že prospektivně-koncepčního priming neměl v naší studii žádný vliv na proenvironmentální záměr a že nevedl k teoreticky očekávanému efektu na časové zaměření na budoucí dopady. Toto zjištění interpretujeme tak, že prospektivně-koncepčního priming má pravděpodobně jen velmi malý efekt, který není dostatečný pro manipulaci s časovou perspektivou lidí ve studiích, jako je ta naše. Nicméně exploratorní analýza naznačuje, že hraničními podmínkami prospektivně-koncepčního primingu by mohl být čas strávený primingem nebo pozornost účastníků. Nicméně naše zjištění teoreticky očekávané pozitivní asociace mezi časovým zaměřením na budoucí dopady a proenvironmentálním záměrem--znovu--zdůrazňuje, že budoucí studie by měly zkoumat potenciální kauzální podklad této asociace.

## **Keywords**

Consideration of future consequences, pro-environmental behavior, pro-environmental intention, time perspective, randomized experiment

## **Klíčová slova**

Časové zaměření na budoucí dopady, pro-environmentální chování, pro-environmentální intence, časová perspektiva, randomizovaný experiment

## **Title**

**Causal effect of consideration of future consequences on pro-environmental intention**

## **Název práce**

**Kauzální vliv časového zaměření na budoucí dopady na záměr proenvironmentálního chování**

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*„People find it hard to give the same level of reality to the future as they do to the present.“ – Anthony Giddens*

## **Introduction**

As I was reading the above quote, I reflected on the significance of one's time perspective in understanding reality, everyday life, and the decision-making process. How does one's time perspective influence pro-environmental behavior? Can time perspective be manipulated? Could these manipulations influence the perception and resolution of environmental problems in the context of climate change? Climate change is one of the key problems humanity is facing in the 21st century. It results in drastic and irreversible changes on the planet Earth (Wyss et al., 2022). Climate change is strongly connected to the consequences of globalization such as the advancement of industrialization and technologies and the overall development of society. This development resulted in a rapid increase in emissions, general pollution, and other negative ecosystem changes (Zhang et al., 2022). Since a significant part of emissions is created by individual energy choices, an individual behavior change is required to mitigate climate change and to achieve a sustainable society (Wyss et al., 2022). Building on these facts, this thesis explores the theory behind the impact of time perspective on pro-environmental behavior, specifically we explore the manipulation of the temporal aspect of pro-environmental decision-making (time perspective) and pro-environmental behavior.

The importance of time in behavior was brought into sociology by Schütz who argued that one's experience of past and future has a direct effect on one's behavior through the motives of action (Tada, 2019). The recent literature (e.g., Joireman et al., 2004) shows that time (time perspective) plays an important role in social dilemmas.

Environmental decision-making is considered to be a social dilemma (Joireman et al., 2004; Joireman & King, 2016; Kortenkamp & Moore, 2006). A social dilemma consists of two components – social and temporal. The temporal component describes the dilemma between immediately gaining the subject of self-interest vs. the collective interest that can be gained in the long term (Joireman et al., 2004). One of the subjects of social dilemmas is pro-environmental behavior (Joireman et al., 2004).

Numerous studies (e.g., Bruderer Enzler, 2015; Joireman et al., 2001; Milfont & Gouveia, 2006) explored the relationship between pro-environmental behavior and time

perspective constructs. In this thesis, time perspective is measured by consideration of future consequences (CFC; Strathman et al., 1994). This construct refers to changing people's behavior while considering the possible events and outcomes in the future. It is affected by a temporal aspect of social dilemma as presented above. Strathman et al. (1994) and the following studies examined the effect of CFC on constructs of pro-environmental behavior and found CFC as its statistically significant and strong predictor. However, the malleability of CFC became a matter of debate.

Two experimental studies successfully manipulated participants' time perspective, supporting the finding that CFC is a changeable construct. The first of these experiments was carried out by Cheng et al. (2012). They shifted 13 Future Time Perspective (FTP) items of ZTPI (Zimbardo's Time Perspective Inventory; see Zimbardo & Boyd, 1999) by using prospect-concept priming - participants in the experimental condition scored higher in the FTP than participants in the control condition. Building on these results, another experiment was performed by Arnocky et al. (2014). They proved that prospect-concept priming has an effect on CFC, specifically shifting CFC-Immediate. CFC-I also mediated the effect of the manipulation on environmental concern and pro-environmental intention, bringing the first empirical evidence of manipulation of time perspective on pro-environmental behavior.

Arnocky et al.'s (2014) findings indicate that the temporal aspect of pro-environmental behavior could be used for climate change mitigation, for instance for enhancing sustainability initiatives. Arnocky et al. (2014) stated that temporal manipulations could induce pro-environmental intention as well as attitudes. However, since this is the only study that examined the causal effect of time perspective on pro-environmental behavior, further causal evidence is needed.

**Goals of this thesis.** The main goal of this study is to further clarify the causal effect of time perspective manipulation on pro-environmental behavior while connecting the concept of temporal manipulation, consideration of future consequences, and pro-environmental intention. This study specifically aims to answer the following research question: Can time perspective (such as CFC) be a causal factor of pro-environmental behavior? The other goal of this study is to further clarify the effect of prospect-concept priming on CFC.

**Overview of the thesis.** This thesis is a conceptual replication of the study by Arnocky et al. (2014, Study 2). We have chosen the form of a conceptual replication in order to examine the causal effect of prospect-concept priming on pro-environmental intention,

found by Arnocky et al. (2014), in the non-laboratory environment, specifically online. Arnocky et al. (2014) suggest that temporal manipulation can be used to promote pro-environmental behavior in advertisement and awareness campaigns. Social media (such as Facebook or Instagram) play an important part in these campaigns (Mallick & Bajpai, 2019) and thus we consider the online-set replication of the effect found by Arnocky et al. (2014) as important. Our study had the following specifics.

Unlike the original study, we implemented prospect-concept priming in an online setting, as opposed to the original paper-and-pencil experiment, hence eliminating the direct supervision by an experimenter. We have revised the duration of the manipulation, changing it from 3 minutes to a minimum of 30 seconds, before participants can continue to the next question. We used an alternative measure of pro-environmental intention proposed by Minton and Rose (1997) while Arnocky et al (2014) used an Intent of Support subscale (Milfont & Duckitt, 2004). We modified the experimental design by incorporating two experimental groups and the control group while the original study design consisted of only two experimental groups. We used a representative Czech sample ( $N = 598$ ), in contrast to the original study, which utilized a sample of undergraduate students from a mid-sized Canadian university ( $N = 104$ ). Additionally, our study aligned with the principles of open science.

Inside the framework of this thesis, we conducted one pre-registered pilot study and a pre-registered main study. We followed the principles of open science (see Allen & Mehler, 2019; Šimová, 2023; Urban & Černá, 2024). For instance, we register all of the hypotheses and the analytic script before the end of the data collection. We did not access the data nor perform any analysis before the pre-registration was published. These open science principles prevent unethical research procedures such as *p*-hacking or harking. Additionally, we attached materials, data, and the analytic script of this study, correspondingly to the idea of the openness of science for everybody.

**Structure of the thesis.** This thesis is divided into three parts. The first chapter discusses the time perspective, pro-environmental behavior, the dimensionality of CFC, its stability, and malleability. In the second chapter, we introduce the pilot study. In the third chapter, we present the main study. The General Discussion summarizes the empirical results of this work, puts them in a theoretical context, and highlights some of the limitations and implications of the current work.

# **1. Theoretical Framework**

## **1.1 Pro-environmental Behavior**

Pro-environmental behavior is defined as any behavior that reduces the harmful impact of one's behavior or improves sustainability (Steg & Groot, 2018). Specifically, a change in individual behavior towards pro-environmental behavior is trusted to be one of the key ways to mitigate climate change and reduce its negative consequences on the environment (Wyss et al., 2022). There are many factors that predict pro-environmental behavior, such as perceived behavioral control, environmental attitudes, personal moral norms (Bamberg & Möser, 2007), or environmental concern and environmental knowledge (Mansoor & Wijaksana, 2023). Pro-environmental behavior can also be predicted by environmental identity.

Generally, environmental identity can be defined as one's identity connection to nature, environment, and environmental topics (Clayton & Opatow, 2003). The recently most widespread construct of environmental identity was first presented by Clayton and defined as “*a sense of connection to some part of the nonhuman natural environment, based on history, emotional attachment, and/or similarity, that affects how we perceive and act toward the world; a belief that the environment is important to us and an important part of who we are*” (Clayton, 2003, pp. 45–46). The environmental identity was found moderately and positively correlated to pro-environmental behavior (Clayton et al., 2021; Sierra-Barón et al., 2023) and pro-environmental intention (e.g., Lalot et al., 2019). The environmental identity can also be measured by other shorter identity and self-identity scales developed independently of Clayton (see e.g., Fielding et al., 2008; Truelove et al., 2016; Van Der Werff et al., 2013; Whitmarsh & O'Neill, 2010).

Last but not least, pro-environmental behavior is affected by the temporal component of social dilemmas (Joireman & King, 2016), in particular by one's time perspective (e.g., Corral-Verdugo et al., 2006; Milfont et al., 2012; Strathman et al., 1994).

## **1.2 Time Perspective and Individual Behavior**

### **1.2.1 Temporal Aspect of the Social Dilemma**

Pro-environmental decision-making (which results in pro-environmental behavior;

Joireman & King, 2016) can be viewed as a social dilemma (Joireman et al., 2004; Joireman & King, 2016; Kortenkamp & Moore, 2006). A social dilemma is a situation in which people in a group tend to make decisions that have individual benefits for them, but if everyone in the group acts this way, the results are collectively worse off than if everyone acted in the collective interest (Dawes & Messick, 2000). Apart from this social component, social dilemmas consist of a temporal component (Joireman et al., 2004; Joireman & King, 2016; Kortenkamp & Moore, 2006) which describes the conflict between short-term and long-term interests (Joireman et al., 2004). The non-negligible effect of its temporal aspect, described by concepts such as time perspective, on individual behavior was found (e.g., Joireman et al., 2004; Joireman & King, 2016).

### **1.2.2 Time Perspective**

Time perspective is defined as one's perception and experience of time in the past, present, and future (Block, 2014; Jankowski et al., 2020). Individuals can adapt either past, present, or future time perspectives, which affects their making of decisions. Literature suggests that time perspective plays a significant role in individual behavior (for the meta-analysis, see Kooij et al., 2018).

Future time perspective influences broad fields of behaviors, well-being, and motivation. In the domain of behavior, for instance, it is found that the future time perspective is connected to healthy and risk-related behaviors (Kooij et al., 2018). It is suggested that the time perspective partially fills the gap between traits and outcomes (e.g., actual behaviors; Kooij et al., 2018). Importantly, time perspective is connected to pro-environmental behavior (Milfont et al., 2012).

Of note is that the notion of the importance of time preferences finds some interesting parallels in sociological theorization about the role of time in human behavior, including sociological theorizing of time in phenomenological sociology (Tada, 2019). One example would be Alfred Schütz who argued about the role of time in behavior motives. He suggested that Weber's concept of action should also consider the matter of time (Tada, 2019). Specifically, Schütz emphasized the importance of one's experience in time (Muzzetto, 2006) and claimed that experience in time directly affects motives of action by one's inner time orientation (Tada, 2019). Similarly, Niklas Luhmann argued that part of the self is one's temporality (Tada, 2019). Specifically, he suggested that time plays an important role in social systems which are directly affected by their past and future (Luhmann, 1976; Tada,

2019). The current state of knowledge (e.g., Milfont et al., 2012; Strathman et al., 1994) shows that time indeed influences behavior, for instance through temporal constructs as consideration of future consequences.

### **1.2.3 Time Perspective and Pro-environmental Behavior**

Several correlational studies investigated the relationship between pro-environmental behavior and time perspective (Bruderer Enzler, 2015; Corral-Verdugo et al., 2006; Joireman et al., 2001). A meta-analysis conducted by Milfont and colleagues (2012) examined the impact of time perspective (consideration of future consequences, Zimbardo's time perspective inventory) on pro-environmental behavior and attitudes. They found a weak association between pro-environmental attitudes and future time perspective, but a medium effect of future time perspective on pro-environmental behavior. The effect between past-present time perspective and pro-environmental behavior was not statistically significant, while a trivial and statistically significant effect was found between past-present time perspective and pro-environmental behavior. However, Milfont et al. (2012) stated that the trivial effect of past-present time perspective may be caused by the small number of corresponding studies used in the meta-analysis.

### **1.3 Consideration of Future Consequences**

Consideration of future consequences (CFC) can be viewed as an operationalized construct of time perspective (Milfont et al., 2012). It was first presented by Strathman and colleagues (1994). Authors defined the CFC as an “*extent to which individuals consider the potential distant outcomes of their current behaviours and the extent to which they are influenced by these potential outcomes. It involves the intrapersonal struggle between present behaviour with one set of immediate outcomes and one set of future outcomes*” (Strathman et al., 1994, p. 734). In other words, CFC stands for individual differences in considering of immediate and future consequences of possible future behaviors.

Strathman and colleagues (1994) also presented a corresponding Consideration of Future Consequences Scale, consisting of 12 items. Five items are focused on the future consequences and seven items are focused on the immediate consequences. Strathman proposed a one-factor solution of the CFC scale (compound CFC). Nevertheless, later a study based on the exploratory factor analysis performed by Petrocelli (2003) suggested and

validated a two-factor solution of the CFC, creating CFC-Future (Consideration of Future Consequences; CFC-F) consisting of five future items and CFC-Immediate (Consideration for Immediate Consequences; CFC-I) consisting of seven reverse-coded immediate items. The two-factor model was further examined by Adams (2012) who conducted a secondary analysis of the data that were previously analyzed with the one-factor solution of CFC. Thus, he demonstrated the superiority of a two-dimensional solution. Later, Arnocky and colleagues (2014) supported the two-factorial solution by validating the different effects of each of the factors on environmental concern and pro-environmental behavioral motivation, showing that the validity of each of the CFC dimensions lies beyond the factors and suggesting that the CFC subscales could stand on its own. In addition, we performed a confirmatory factor analysis on the data from the pilot study and we found a clear distinction between CFC-F and CFC-I in the Czech context. However, CFC is not the only measure of time perspective.

The other construct that is used to measure the temporal orientation is Zimbardo's time perspective inventory (Zimbardo & Boyd, 1999). It consists of 56 questions and divides the participants' time perspective into five dimensions - Past-Negative, Past-Positive, Present-Hedonistic, Present-Fatalistic, and Future. Several studies (e.g., Corral-Verdugo et al., 2006; Milfont & Gouveia, 2006) proved the relationship between ZTPI and pro-environmental behavior. Nevertheless, CFC and ZTPI seem to overlap (Pozolotina & Olsen, 2019).

### **1.3.1 Stability of CFC**

Since its founding, consideration of future consequences has been viewed as a stable construct. Strathman and colleagues (1994) hypothesized that the reflection of the inner dilemma between the future and present consequences is a stable trait. They also argued that important events in one's life (e.g., a major change in socio-economic status) can influence CFC, on the other hand, they pointed out that further research is needed.

Addressing the topic of empirical evidence of the stability of CFC, Toepoel (2010) conducted a longitudinal study on a web-based Dutch household panel, measuring CFC in 11 waves from 1996 to 2006. Unlike Strathman's homogeneous student sample (which was also used in many other studies), Toepoel used a representative heterogeneous sample of the Dutch population, confirming the internal consistency of CFC in a non-academic setting. Based on this longitudinal survey, the author argued that CFC is a changeable construct and



that it does not have to be stable during the whole life cycle of a person. However, CFC can stay the same for one year. Additionally, Toepole (2010) looked for predictors of CFC.

Gender, age, and income were not found to have a statistically significant influence on CFC. Notably, the insignificance of age goes against the findings of Orbell and colleagues (2004) who suggested that CFC may decrease with age. In Toepoels' study (2010), the only factor that had a statistically significant effect on CFC was education. Toepoel (2010) also claimed that the number of observations in her study was too low to find particular events that caused the shift in CFC, however, she claimed that CFC is changeable.

### **1.3.2 The Use of CFC**

CFC was used in various studies. Here is a summary of important domains where CFC was employed, accompanied by some of the examples of studies presented by Joireman and King (2016).

Most studies were performed in the field of health behavior. For instance, these studies provided the information that people who are high in CFC are more likely to behave in healthier ways than those low in CFC (Joireman et al., 2012). It was also found that those high in CFC have a decreased likelihood of smoking (Adams, 2012). People with high CFC exercise more as well (Ouellette et al., 2005).

CFC plays an important role in financial decision-making, for instance, by affecting processes such as impulsive buying tendencies (Joireman et al., 2005). High CFC is also associated with increased levels of savings (Loibl et al., 2010) or less likelihood of gambling behavior (Toplak et al., 2007).

CFC was furthermore used to explore work behavior and ethical decision-making in organizational contexts. For instance, those high in CFC use more ethical strategies while negotiating (Hershfield et al., 2012)

Lastly, CFC is considered to play a significant role in environmental decision-making and pro-environmental behavior (e.g., Arnocky et al., 2014; Strathman et al., 1994).

### **1.3.3 CFC and Pro-environmental Behavior**

Numerous studies examined the relationship between consideration of future consequences and environmentalism. These studies discovered that CFC is strongly linked to pro-environmental acting and thinking. The founders of CFC, Strathman and colleagues (1994), proved that CFC is linked to pro-environmental behavior. This finding was

supported by many correlational studies (e.g., Bruderer Enzler, 2015; Joireman et al., 2001; Milfont & Gouveia, 2006). Strathman et al. (1994) also found that people high in CFC are more concerned about the environment. Another study that examined environmental concern and pro-environmental intention was conducted by Arnocky et al. (2014), finding that only CFC-Immediate (not CFC-Future) mediates environmental concern and pro-environmental intention.

Building on these findings, other studies examined other environment-related constructs and situations. For instance, Kortenkamp and Moore (2006) found that people high in both CFC and environmentalism are more likely to cooperate in resource dilemmas. Milfont and Gouveia (2006) suggested that CFC is positively connected to pro-environmental attitudes. CFC also affects consumerism and frugal behavior, specifically CFC-Future has a positive effect on the economic dimension of consciousness for sustainable consumption (Suárez et al., 2020). Additionally, CFC-Future negatively affects compulsive buying tendencies while no effect was found for CFC-Immediate (Ahamed, 2022).

#### **1.3.4 Missing Causal Evidence of Time Perspective on Pro-environmental Behavior**

Until now, two experimental studies manipulated the time perspective. The first of these studies was conducted by Cheng et al. (2012) who performed an experiment on 64 undergraduates in order to examine the effect of prospect-concept priming on financial decisions (i.e., delay discounting). They also suggested that Zimbardo's Time Perspective Inventory, specifically its 13-item Future Time Perspective (FTP) scale, could potentially mediate this relationship. Cheng and colleagues (2012) used two experimental conditions, asking participants to think about their everyday life either four years in the future (prospect-concept condition) or in the present (present condition). As expected, participants in the prospect-concept condition were more likely to wait for a larger payment in the future than for a smaller payment now. The FTP scale of ZPTI was confirmed as a mediator with participants in the prospect-concept condition scoring higher in FTP than participants in the present condition. Cheng et al. (2012) also argued that in this case, ZPTI serves as *a transitory psychological state* rather than a stable individual extent. Later, another study used prospect-concept priming to manipulate the time perspective.

Building on Cheng et al.'s (2012) findings, Arnocky et al. (2014) carried out an experiment on 104 undergraduate students from a mid-sized university in Canada. They explored the effect of prospect-concept priming on CFC, environmental concern, and environmental behavioral motivation (pro-environmental intention). CFC-F and CFC-I were used as mediators. Participants were manipulated by a modified version of prospect-concept priming first presented by Cheng et al. (2012). This experiment used two conditions (present and future), similar to the original experimental design of Cheng et al. (2012). Arnocky and colleagues (2014) revealed that participants in the future condition scored higher in environmental concern and pro-environmental intention. The results also show that the effect of future-priming on environmental concern and pro-environmental intention is partially mediated by CFC-I (not CFC-F). In their analysis of CFC, Arnocky and colleagues found that participants in the future condition scored statistically significantly lower in CFC-I than participants in the present condition. However, CFC-F did not differ between conditions. Nevertheless, by not including a control group, Arnocky et al. (2014) suggested that it is unclear if future-priming reduced CFC-I or if present-priming increased CFC-I. These effects open a debate about the stability of CFC.

The experimentally caused shift in CFC found by Arnocky (and the similar shift in FTP of ZTPI discovered by Cheng) does not correspond with the idea of CFC as a stable construct that can be only influenced by important events in one's life as presented by Strathman et al. (1994) and Toepoel (2010). In this case, CFC could rather be presented as a temporary psychological state, similar to the proposed serve of ZTPI in the experiment conducted by Cheng et al. (2012).

To conclude, only two experimental studies manipulated the time perspective and only one manipulated consideration of future consequences as well as pro-environmental behavior. As such, there is a huge missing causal evidence of time perspective on pro-environmental behavior.

## **2. Pilot Study<sup>1</sup>**

Together with my undergraduate colleagues and the supervisor, we conducted a web-

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<sup>1</sup>Preregistration, measures, data, and analytic script of the pilot study can be found at this link: [https://osf.io/2jczq/?view\\_only=a3846e3d8bb54409ba11d045ea770a19](https://osf.io/2jczq/?view_only=a3846e3d8bb54409ba11d045ea770a19)

based pilot study during the course The Practice in Quantitative Research I and II in the Faculty of Social Sciences, Charles University. In this pilot study, we tested the usage of prospect-concept priming in an online setting and its impact on pro-environmental intention and the CFC in the Czech context. Specifically, we expected that participants in the experimental group future will have higher pro-environmental intention score than those in the experimental group present (H1) and that participants in the experimental group future will have higher CFC score than those in the experimental group present (H2).

## 2.1 Method

### 2.1.1 Sample Size Justification

Using *G\*Power* software, we conducted a power analysis to determine the power of the study for the planned sample size ( $N = 300$ ). This analysis revealed that the study would have a very high power (83%) to detect a small size ( $d > .30$ ) of the effect of the manipulation on CFC and pro-environmental intention (one-tailed *t*-test,  $\alpha = .05$ ) but the study would not be sufficiently powered (power of .53) to detect a very small effect size ( $d = .20$ ).

### 2.1.2 Participants

A convenience sample of participants, contacted via the authors' social media, was invited to the study. 570 participants entered the study online but only 271 participants completed the study (completion rate of 48%). The sample ( $N_{\text{total}} = 271$ ,  $N_{\text{present}} = 151$  participants,  $N_{\text{future}} = 120$ ) was variable in terms of gender (58.7% of participants were females), but was very young ( $M = 23$ ,  $SD = 9.19$ ), and was highly educated (14% had primary or lower education, 5% had secondary education without leaving the exam, 68% had secondary education with the leaving exam and 13% had tertiary education).

### 2.1.3 Materials

**Experimental manipulation.** We manipulated participants' time perspectives using prospective concept priming (Arnocky et al., 2014). This manipulation consists of a guided imagery task designed to induce either a future-oriented or a present-oriented mindset. These primings were time-locked for 30 seconds in order to increase participants' attention.

In the experimental group future (future-priming), we asked participants to imagine their typical day four years in the future. In the experimental group present (immediate

priming), we asked participants to imagine their current typical day. The Czech version of the texts (65 - 75 words long) is available in the Materials section on OSF. Both texts were adopted from Arnocky et al. (2014, p. 12) and translated into Czech. Specifically, two translators separately translated both texts into Czech, next, two other correctors merged both versions of translations, and finally, three other correctors corrected and enhanced the final texts.

**Future-priming (experimental group future).**

*“Please take a few minutes to envision what your everyday life circumstances might be like FOUR years in the future. Visualize what happens on a typical day from the time you wake up until you go to sleep, FOUR years in the future. Try to include as much detail as possible (sights, sounds, smells, etc.). Take three deep breaths before you begin. Feel free to close your eyes during this task. You will be verbally instructed when to stop. Please do not turn the page until instructed to do so.”*

**Immediate-priming (experimental group present).**

*“Please take a few minutes to envision what your everyday life circumstances are. Visualize what happens on a typical day (such as today) from the time you wake up until you go to sleep. Try to include as much detail as possible (sights, sounds, smells, etc.). Take three deep breaths before you begin. Feel free to close your eyes during this task. You will be verbally instructed when to stop. Please do not turn the page until instructed to do so.”*

**Consideration of future consequences.** We measured CFC using a scale from Strathman et al. (1994). The scale consists of 12 statements. Five items measure how much people are focused on the future (CFC-future); an example of an item: “I am willing to sacrifice now to achieve future outcome.” Seven items measure how much people are focused on the present (CFC-immediate); an example of an item: “My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.” Participants evaluate each statement on a five-point Likert-type scale (1 = *extremely uncharacteristic*, 5 = *extremely characteristics*). The Czech version of the scale is adopted from Urban and Vačkářová (2020). In the pilot study, CFC served as a manipulation check. We calculated the CFC score as the average of five CFC-F items and seven reverse-coded CFC-I items.

**Pro-environmental intention.** We measured pro-environmental intention with the Behavioral Intentions Measures scale adopted from Minton and Rose (1997). The scale consists of six items (an example of an item: “I would be willing to sign a petition to support

an environmental cause”). Responses are captured on a seven-point Likert scale (1 = *completely disagree*, 7 = *completely agree*). The Czech version of the scale is taken from Urban et al. (2021). We used the mean score in the analysis.

### **2.1.4 Study Design**

This study has a design of a between-subject randomized experiment with two experimental groups (future-priming, immediate-priming). Participants were randomly assigned to one of the two experimental groups (each group had the same assignment probability).

### **2.1.5 Procedure**

Participants were invited to an online study ostensibly focusing on decision-making and reasoning. The questionnaire was built in LimeSurvey. After providing their informed consent, participants were randomly assigned to one of the two conditions. Then, participants completed the priming task. Next, participants completed the CFC scale and the measure of pro-environmental intention. At the end of the questionnaire, all participants provided their socio-demographics and then were debriefed and thanked for their participation.

## **2.2 Analysis**

To assess the effect of the manipulation on the manipulation check, we compared the average scores of CFC between the conditions. We integrated this first step to verify the effect of manipulation on the participants’ time perspective. Not finding the shift in CFC across the experimental conditions could indicate the non-functionality of the manipulation, hence preventing us from the second step of the analysis. The second reason could be the insufficient choice of CFC as a manipulation check.

For this comparison, we used an independent sample *t*-test (one-sided,  $\alpha = .05$ ). For testing both H1 and H2, we created two subsets for each of the experimental groups. The scores of CFC and pro-environmental intention were calculated as the average score of all items as described in the Materials section.

Subsequently, we performed the *t*-tests. In H2, we compared the average score of CFC between the two subsets. In H1, we compared the average pro-environmental intention.

The analysis was performed in the RStudio. In the first step, we analyzed the effect

of manipulation on CFC (manipulation check) and then, in the second step, we examined how prospect-concept priming affects pro-environmental intention. Incomplete observations were listwise excluded.

## 2.3 Results

The analysis of the effect of the prospect-concept priming on the consideration of future consequences was marginally statistically significant,  $t(253.14) = -1.47, p = .072$ . We found only a small effect,  $d = .19$ . This result partially supported H2 on  $\alpha = .10$ . In the experimental group present, the average CFC score was  $M = 3.56 (SD = 0.47)$ , whereas in the experimental group future, the average CFC score was  $M = 3.65 (SD = 0.48)$ .

The pilot study revealed a negligible and statistically insignificant effect of the manipulation on pro-environmental intention  $t(268.23) = -1.13, p = .131, d = .14$ . This result did not support H1. The average pro-environmental intention score in the experimental group present was  $M = 4.66, SD = 1.11$ , in comparison to the experimental group future  $M = 4.80, SD = 0.93$ .

## 2.4 Discussion

The prospect-concept priming had a marginally statistically significant causal effect on the CFC. Nevertheless, the effect of prospect-concept priming on pro-environmental intention did not reach the required statistical significance. Despite that, the difference in mean scores between groups suggested a positive association between manipulating of time perspective and pro-environmental intentions.

These results indicated the effectiveness of Arnocky et al.'s (2014) approach to time perspective manipulation in the Czech context and the online setting. The results also hinted at a potential positive effect of future time perspective on pro-environmental intention.

Nevertheless, the pilot study revealed some limitations. There was a significant drop-out rate (about 50%) during the priming task. In addition, the drop-out rate resulted in different sample sizes of experimental groups ( $N_{\text{present}} = 151, N_{\text{future}} = 120$ ). We suggested that a larger sample size would be necessary for statistically significant results at the intended 5% alpha level. A tool that could limit the drop-out rate (such as a financial reward for participants) would be required. We suggested that further research is needed to fully explore the causal effect of pro-environmental intention and CFC.

### 3. Main Study<sup>2</sup>

The goal of the main study was to deepen the understanding of the causal role of CFC on pro-environmental intention, specifically in the online environment. We followed up on the pilot study which hinted at the effect of prospect-concept priming on CFC and pro-environmental intention. We modified the study design by adding a control condition and the attention check (see Figure 1) and we used a bigger and representative sample.

#### 3.1 Method

##### 3.1.1 Hypotheses

Based on the literature review and the pilot study, we formulated the following hypotheses and sorted them into three groups. For a more analytic formulation of the hypotheses, see Appendix no. 1.

The main hypotheses explored the global effect of prospect-concept priming on CFC and pro-environmental intention. Secondary hypotheses reflected specific effects of prospect-concept priming on pro-environmental intention and the two facets of CFC. Parallel mediation hypotheses explored the mediation effect of CFC-F and CFC-I in the relationship between specific primings and pro-environmental intention.

##### **Main hypotheses.**

H1: There is a positive global effect of prospect-concept priming on the compound measure of CFC. Specifically, we expect that future-priming will increase and immediate-priming will decrease compound CFC (compared to the control group). (Higher values of the compound measure of CFC indicate a focus on future consequences and lower values indicate a focus on immediate consequences.)

H2: There is a positive global effect of prospect-concept priming on pro-environmental intention. Specifically, we expect that future-priming will increase and immediate-priming will decrease pro-environmental intention (compared to the control group).

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<sup>2</sup>Preregistration, measures, data and analytic script of the Main study can be found at this link: [https://osf.io/hmkcr/?view\\_only=d0e2d4f049f346c483684d9abd5bd4bf](https://osf.io/hmkcr/?view_only=d0e2d4f049f346c483684d9abd5bd4bf)

Ethical standards of this study have been reviewed by the by the Institutional Review Board of the Charles University Environment Centre (see Appendix no. 3).



**Secondary hypotheses.** Specific effects of priming on the two facets of CFC:

H3: Future-priming increases the CFC-F compared to the control group.

H4: Immediate-priming decreases the CFC-F compared to the control group.

H5: Future-priming decreases the CFC-I compared to the control group.

H6: Immediate-priming increases the CFC-I compared to the control group.

Specific effects of future and immediate priming on pro-environmental intention:

H7: Future-priming increases the pro-environmental intention compared to the control group.

H8: Immediate-priming decreases the pro-environmental intention compared to the control group.

**Parallel mediation.**

H9: In a parallel mediation model (with CFC-F and CFC-I as parallel mediators), the effect of future-priming on pro-environmental intention is mediated either by CFC-F or CFC-I or both.

H10: In a parallel mediation model (with CFC-F and CFC-I as parallel mediators), the effect of immediate-priming on pro-environmental intention is mediated either by CFC-F or CFC-I or both.

### 3.1.2 Sample Size Justification

Before conducting the study, we ran a power analysis for contrast *ANOVA* using the WebPower package of R. This analysis revealed that contrast *ANOVA* in the current study ( $N = 600$ ) will have a power of .95 to find a small effect size ( $f = 0.15$ ,  $\alpha = .05$ ).

### 3.1.3 Participants

The data were collected online using a sample of participants recruited from an online panel of an opinion poll company. The sample was representative of the general population of the Czech Republic aged 18-70. Participants were sampled from the panel using quota sampling for gender (two categories), age (five categories), education (four categories), and region (14 categories). We collected the data from the 27th of March to the 5th of April.

852 participants entered the study and 611 completed it (for the drop-out rate of 28%). After the exclusion of 13 observations from participants who accessed the questionnaire two times, the final sample consisted of 598 valid participants ( $N_{present} = 209$ ,

$N_{control} = 205, N_{future} = 184$ )

The remaining sample was variable in terms of gender (49% of participants were females), age ( $M = 45.52, SD = 15.52$ ), education, and region.

### 3.1.4 Materials

**Experimental manipulation.** We used the same manipulation as in the pilot study.

**Consideration of future consequences.** In addition to the measure of CFC in the pilot study, in the main study, CFC served as a manipulation check and a mediator. We calculated the compound measures of CFC as the average of five CFC-F items and seven reverse-coded CFC-I items. The scores for the two facets were calculated by computing average scores from CFC-I and CFC-F, respectively. Item order in the CFC scale was randomized. The CFC scale showed good internal consistency,  $\alpha = .748$ .

**Pro-environmental intention.** We used the same measurement of pro-environmental intention as in the pilot study. In addition, item order in the Behavioral Intentions Measures scale was randomized and we reduced the labels of the scale only to endpoints to be as close as possible to the original measurement. The Behavioral Intentions Measures scale showed good internal consistency, Cronbach's Alpha for the survey was  $\alpha = .857$ .

**Attention check.** To check if the participants paid attention to the manipulation text, we asked them to indicate whether the manipulation text asked them to focus on the presence, the future, or the past. We conducted a sensitivity check with respect to the attention check. 65.7% of participants filled out the attention check correctly.

### 3.1.5 Study Design

This study has a design of a between-subject randomized experiment with two experimental groups (future-priming, immediate-priming) and a control group. Participants were randomly assigned to one of the two experimental groups or a control group (each group has the same assignment probability).

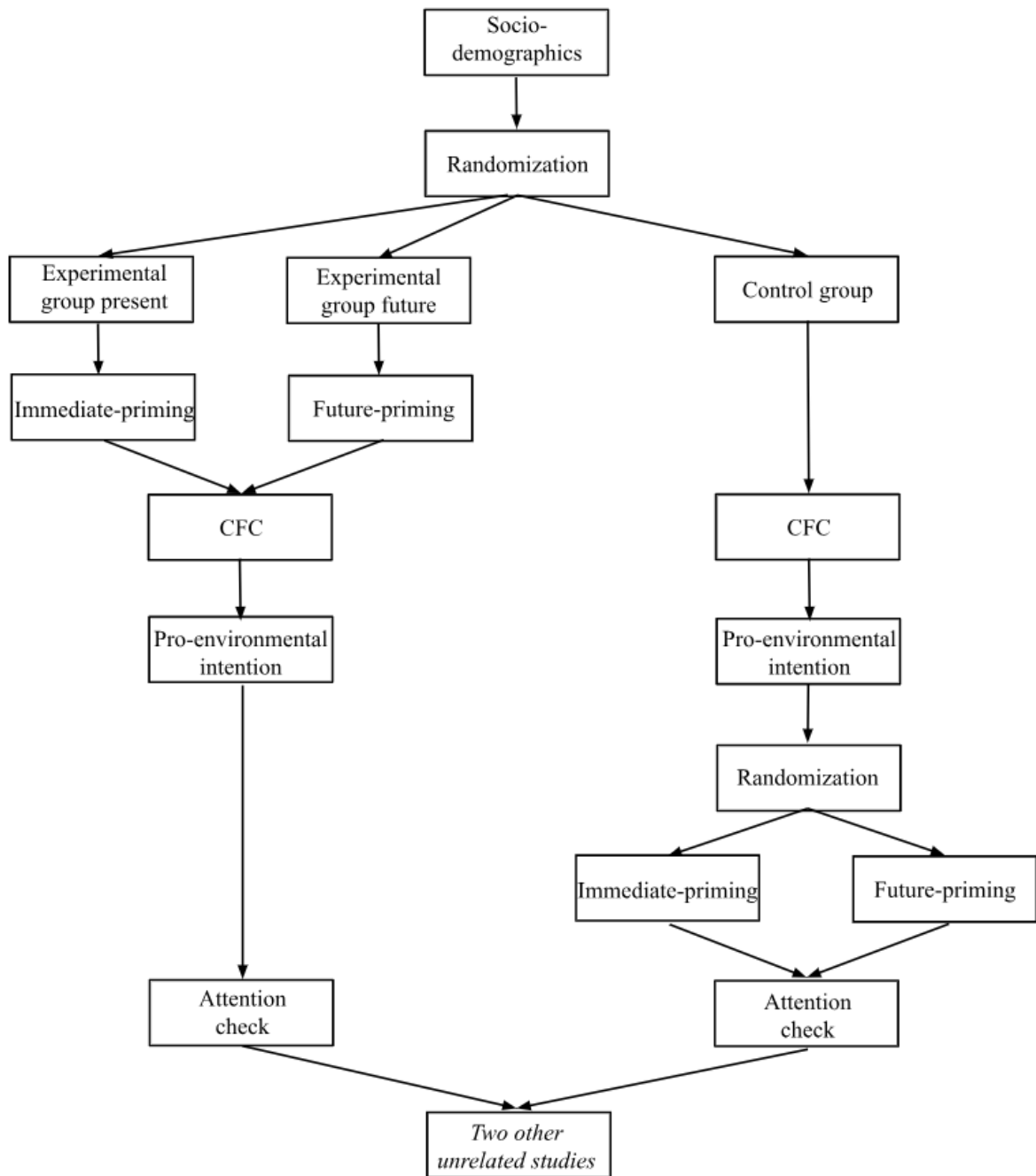
### 3.1.6 Procedure

Participants recruited from a participant panel of an opinion poll company were invited to a web-based study ostensibly focusing on reasoning and decision-making. The questionnaire was built in LimeSurvey. First, participants provided their socio-

demographics due to the quota screening. After providing their informed consent, they were randomly assigned to one of the three conditions. Participants in experimental conditions completed the priming task. Next, participants completed the CFC scale and the measure of pro-environmental intention. Participants in the control condition then completed one of the two priming tasks (chosen randomly). At the end of this study, participants completed the attention check. All participants then proceeded to another two studies unrelated to the current study. At the end of the questionnaire, all participants were forwarded to the landing page of the opinion poll company to receive debriefing information and a reward for their participation in the study (20 CZK, an equivalent of 0.80 USD).

**Figure 1.**

*The flow of the study*



*Note.* This figure depicts the flow of the main study. Each of the boxes represents a set of questions, randomization, or condition labels. Participants went through the study from top to bottom. The first randomization created the conditions, the second randomization determined the specific priming texts in the control group.

## 3.2 Analysis

**Data preparation and transformation.** First, we downloaded the data from the LimeSurvey and loaded the data into R. Then, we created a data frame consisting only of data relevant to this study (the questionnaire consisted of three consecutive and unrelated studies).

Next, we prepared new variables. We created a variable that determined the membership of participants to the conditions (`manipType`). This variable was based on the first randomization in the questionnaire (variable `rand`). Next, we created a factor variable of the manipulation type (`manipTypeFactor`). We created another variable to determine if participants in the control group received future or immediate-priming (`manipCont`), which was based on the second randomization in the study (variable `rand2`). The general type of treatment was coded in another variable (`priming`), based on the variable `manipType` for experimental groups and `manipCont` for the control group. We recoded participants answers to the attention check into a new variable (`attentionChoice`) to correspond with the manipulation coding in the variable `priming` (e.g., immediate-priming and attention check answer “present” were both coded as -1). Subsequently, we reverse-coded seven CFC-Immediate items and we created a new variable (`intention`) as a mean of six items of pro-environmental intention measure. Then, we computed the mean of all CFC items into a new variable (`cfc`). Finally, we calculated variables that determined the means of corresponding CFC-Immediate (`cfc_i`) and CFC-Future (`cfc_f`) items.

**Main hypothesis testing.** To test hypothesis H1 about the global effect of future and immediate-priming on the compound measure of CFC, we conducted a *One-Way ANOVA* with manipulation levels coded using polynomial contrasts and we tested for the linear and quadratic effect of contrast-coded manipulation levels. First, we prepared linear and quadratic orthogonal polynomial contrasts and saved them into vectors. Then, we combined these vectors into a matrix and we set this matrix to the variable `manipTypeFactor` to set the contrasts. Next, we tested H1 with the variable `cfc` as the dependent variable and the grouping variable `manipTypeFactor`.

To test H2 about the global effect of prospect-concept priming on pro-environmental intention, we used the same type of *ANOVA* with `intention` as the dependent variable and `manipType` as the independent variable.

**Secondary hypothesis testing.** To further assess the effect of either future or

immediate priming on the CFC, we tested the relationship between its two facets CFC-I and CFC-F. We used independent sample *t*-tests (one-sided,  $\alpha = .05$ ).

To test H3, we compared the average level of CFC-F in the experimental group future compared to the control group. We expected that participants in the experimental group future would have higher CFC-F. In H4 we compared CFC-F in the control group with CFC-F in the experimental group present. We expected that participants in the experimental group present would have lower CFC-F.

In H5, we examined CFC-I in the experimental group future compared to the control group. We expected that participants in the experimental group future would have lower CFC-I. In H6 we compared CFC-I between the experimental group present and the control group. We expected that participants in the experimental group present have higher CFC-I.

To better understand the effect of either the future or immediate-priming on pro-environmental intention, we tested these effects in H7 and H8 using independent sample *t*-tests (one-sided,  $\alpha = .05$ ).

In H7 we tested the relationship between average pro-environmental intention in the experimental group future compared to the control group. We expected that participants in the experimental group future would have a higher pro-environmental intention. In H8, we compared pro-environmental intention in the experimental group present compared to the control group. We expected that participants in the experimental group present would have a lower pro-environmental intention score than participants in the control group.

**Parallel mediation test.** To further examine the theoretically expected role of CFC as a mediator of the effect of prospect-concept priming on pro-environmental intention, we conducted two parallel mediation tests. Mediation analysis helps to understand the effect between independent and dependent variables, specifically, it helps to resolve if the effect is direct or indirect through another variable that serves as a mediator (MacKinnon et al., 2007).

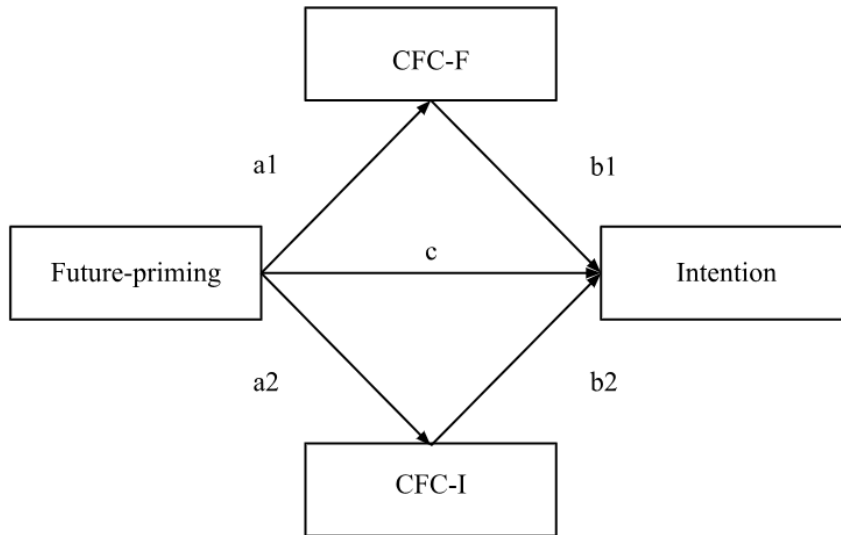
We conducted two mediation tests, one for the future-priming and one for the immediate-priming. In these tests, we looked at whether CFC-I, CFC-F, or both (or none) mediate this relationship. We computed indirect effects as multiples of corresponding standardized regression coefficients ( $a_1*b_1$  for CFC-F,  $a_2*b_2$  for CFC-I). We computed the total effect which represents the overall relationship between particular primings and pro-environmental intention.

To test H9, we tested a mediation model for future-priming (for details see Figure 2). First, we created a subset that consists of the experimental group present and the control

group. Next, we used structural equation modeling to set the paths and to calculate the direct and indirect effects. For the SEM, we used the R package lavaan. We incorporated variable intention as a dependent variable and *cfc\_f* and *cfc\_i* as mediators.

**Figure 2**

*Future-priming parallel mediation model*

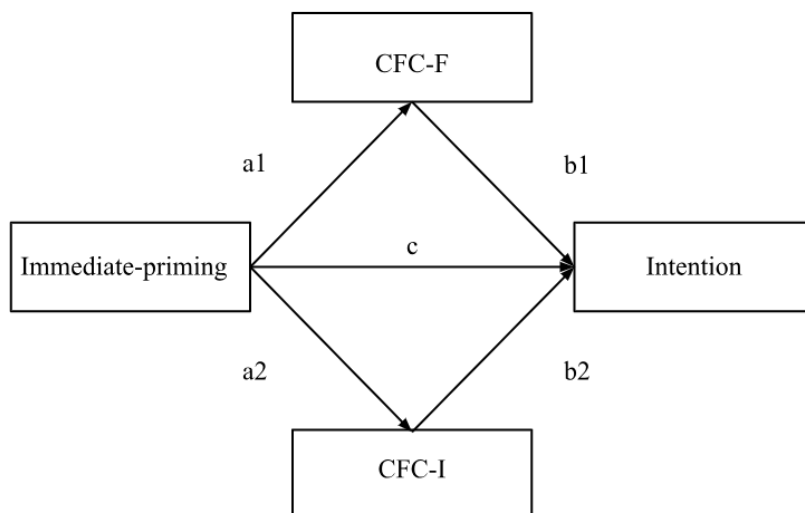


*Note:* This figure shows the parallel mediation model of future-priming on pro-environmental intention with CFC-F and CFC-I as parallel mediators. The parameters  $a_1$ ,  $a_2$ ,  $b_1$ ,  $b_2$ , and  $c$  represent the effects between the variables.  $A_1$  stands for the effect of future-priming on CFC-F, and  $a_2$  for the effect of future-priming on CFC-I. Path  $b_1$  depicts the effect of CFC-F on pro-environmental intention, and path  $b_2$  the effect of CFC-I on pro-environmental intention. Parameter  $c$  is the direct effect of future-priming on pro-environmental intention.

To test H10, we conducted a parallel mediation analysis for immediate-priming (for details see Figure 3). We used the same procedure as in H9, we only used a new subset consisting of the experimental group future and the control group. This mediation test did not find any direct or indirect effect of immediate-priming on pro-environmental intention.

**Figure 3**

*Immediate-priming parallel mediation model*



*Note:* This figure shows the parallel mediation model of immediate-priming on pro-environmental intention with CFC-F and CFC-I as parallel mediators. The parameters  $a_1$ ,  $a_2$ ,  $b_1$ ,  $b_2$ , and  $c$  represent the effects between the variables.  $a_1$  stands for the effect of immediate-priming on CFC-F, and  $a_2$  for the effect of immediate-priming on CFC-I. Path  $b_1$  depicts the effect of CFC-F on pro-environmental intention, and path  $b_2$  the effect of CFC-I on pro-environmental intention. Parameter  $c$  is the direct effect of future-priming on pro-environmental intention.

**Attention check.** To analyze an attention check, we conducted a simple sensitivity check. We compared the variable priming with the variable attentionChoice and we saved the outcome into the variable sensitivityCheck. Next, we computed relative frequencies for the whole sample. We evaluated the attention check separately for each of the experimental groups, the control group, both experimental groups together, all of the participants who received future-priming (experimental group future and control group with future-priming), and the participants who received immediate-priming (experimental group present and control group with immediate-priming).

By incorporating these partial evaluations, we aim to determine whether one experimental condition outperforms the other in terms of attention check or if the control group outperforms the experimental groups. We hypothesize that these differences could be



created for instance by different placements of the manipulation and the attention check across different conditions (see Figure 1). Another possible explanation could be the hypothetical difference in perceived difficulty resulting in the lack of willingness to complete the priming across manipulations. 34% of the participants did not pass the attention check and the rate was variable across the conditions (70% in the experimental group present, 11% in the experimental group future, 19% in the control group).

**Exploratory analysis.** In a non-registered exploratory analysis, we explored the results of the attention check in the control group separately for each of the priming tasks to understand its different results across the conditions. We also checked the exact attention check answers of participants in the experimental group present. Additionally, we checked for the theory-based positive association between CFC and pro-environmental intention. Specifically, we performed a correlation analysis.

We also checked for the expected association between pro-environmental intention and environmental self-identity. The environmental self-identity measure<sup>3</sup> was incorporated at the beginning of the second unrelated study during the data collection. The environmental self-identity was measured with a mixture of nine items taken from Fielding et al. (2008), Truelove et al (2016), and Van Der Werff et al. (2014). Specifically, we performed a correlation analysis.

We also performed H1 and H2 testing (*One-Way ANOVAs*) on a reduced sample. We used only the second and third quartiles of participants filtered by the time they spent in the manipulation task, separately for each of the experimental conditions. Participants in the control group were not filtered out<sup>4</sup>. 402 participants entered this analysis ( $N_{\text{present}} = 105$ ,  $N_{\text{control}} = 205$ ,  $N_{\text{future}} = 90$ ). We hypothesized that this procedure could omit participants who did not pay attention to the manipulation by spending too little or too much time on the priming task.

**Technical information.** The analysis of the main study was conducted in statistical framework R. Incomplete observations were list-wise excluded.

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<sup>3</sup>For the details of this measurement, see the corresponding pre-registration [https://osf.io/3scd4/?view\\_only=ec354bb5ffa24713b59100835f8eb6a2](https://osf.io/3scd4/?view_only=ec354bb5ffa24713b59100835f8eb6a2)

<sup>4</sup>If we apply the same filtering procedure to participants in the control group, the effect of prospect-concept priming on CFC and pro-environmental intention would be statistically significant and in the same direction as in the whole sample. For the detailed procedure and results, see Appendix no.4.

## 3.3 Results

### 3.3.1 Primary Hypotheses

**Effect of manipulation on CFC.** A *One-Way ANOVA* with polynomial contrasts showed that the global effect of treatment on CFC was not statistically significant,  $F(2, 594) = 2.984, p = .051$ . The analysis revealed the statistically significant linear component of the effect,  $F(1, 594) = 5.928, p < .05$ , while the quadratic component was statistically insignificant,  $F(1, 594) = 0.040, p = .841$ . Partial eta-squared revealed only a negligible effect size,  $\eta_p^2 = 0.0099$ .

The means of CFC were distributed in the opposite direction than in the pilot study and also contrary to theoretical expectations. Participants in the experimental group present scored highest in the CFC ( $M = 3.42, SD = 0.49$ ), participants in the control group were placed in the middle ( $M = 3.35, SD = 0.59$ ), and participants in the experimental group future scored the lowest in CFC ( $M = 3.29, SD = 0.46$ ). Thus, H1 was not supported. Based on these results we did not find the expected causal effect of manipulation on CFC.

However, the non-registered analysis of the second and third quartile of participants, based on the time spent in the manipulation, revealed statistically significant effect of prospect-concept priming on CFC,  $F(1, 398) = 3.815, p < .05$ . The analysis also revealed the statistically significant linear component of the effect,  $F(1, 398) = 7.189, p < .01$ . The quadratic effect was not statistically significant,  $F(1, 398) = 0.441, p = .507$ . The distribution of means was in the same order as in the test for the whole sample. Participants in the experimental group present scored highest in the CFC ( $M = 3.48, SD = 0.48$ ), participants in the control group were placed in the middle ( $M = 3.35, SD = 0.59$ ), and participants in the experimental group future scored the lowest in CFC ( $M = 3.29, SD = 0.48$ ). This result suggests that either priming duration or attention of the participants could play a role in the underlying effect of prospect-concept priming on CFC.

Further exploratory analysis found a weak positive correlation between CFC and pro-environmental intention,  $r(596) = .197, p < .001$ . It also revealed a moderate positive correlation between pro-environmental intention and environmental self-identity,  $r(596) = .197, p < .001$ . We found the expected associations between CFC and pro-environmental intention and pro-environmental intention and environmental identity. This means that the measures of CFC and pro-environmental intention are valid in this study within the Czech

context.

**Table 1**

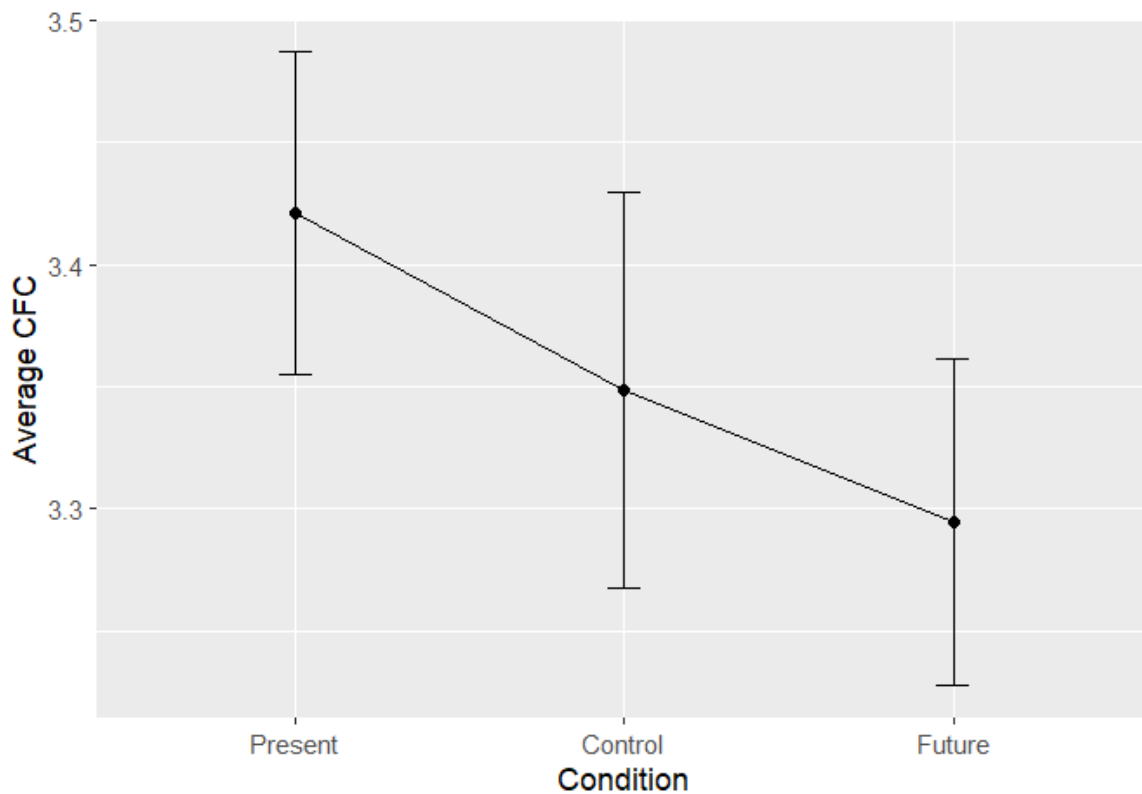
*CFC by conditions in the whole sample*

	<i>N</i>	<i>M</i>	<i>SD</i>
Present	209	3.42	0.49
Control	205	3.35	0.59
Future	184	3.29	0.46

*Note:* Labels present, control, and future represent the corresponding conditions, respectively.

**Figure 4**

*CFC by conditions in the whole sample*



*Note:* Points and error bars capture the means and 95% CI, respectively. Present, control, and future are the indications of conditions. Average CFC is the mean of consideration of future consequences calculated for each of the conditions, respectively.

**Effect of manipulation on pro-environmental intention.** The analysis showed that the effect of treatment on pro-environmental intention was not globally statistically significant,  $F = 1.144 (2, 594), p = .319$ . Analysis of this global effect revealed no linear effect,  $F = 1.390 (1, 594), p = .239$ , and also no quadratic effect,  $F(1, 594) = 0.897, p = .344$ . Partial eta-squared showed only a trivial effect size,  $\eta_p^2 = 0.0038$ . Thus, H2 was not supported. Results show that the prospect-concept priming was not strong enough to affect the pro-environmental intention.

Further analysis revealed that contrary to the theoretical expectations, participants in immediate-priming group had the highest pro-environmental intention,  $M = 3.72, SD = 1.27$ , followed by future-priming group,  $M = 3.57, SD = 1.27$ , and the control group,  $M = 3.54, SD = 1.43$ .

Nonetheless, the non-registered analysis of second and third quartile of participants, based on the time they spent in the manipulation, revealed a statistically significant effect of prospect-concept priming on pro-environmental intention,  $F(1, 398) = 3.491, p < .05$ . We found no statistically significant linear effect,  $F(1, 398) = 3.315, p = .069$ , and no statistically significant quadratic effect  $F(1, 398) = 3.668, p = .056^5$ . Participants in the immediate-priming group had the highest pro-environmental intention,  $M = 3.97, SD = 1.29$ , followed by future-priming group,  $M = 3.63, SD = 1.28$ , and the control group,  $M = 3.54, SD = 1.43$ . This result suggests that either the priming time or the attention of the participants could influence the effect of prospect-concept priming on pro-environmental intention.

**Table 2**

*Pro-environmental intention by conditions in the whole sample*

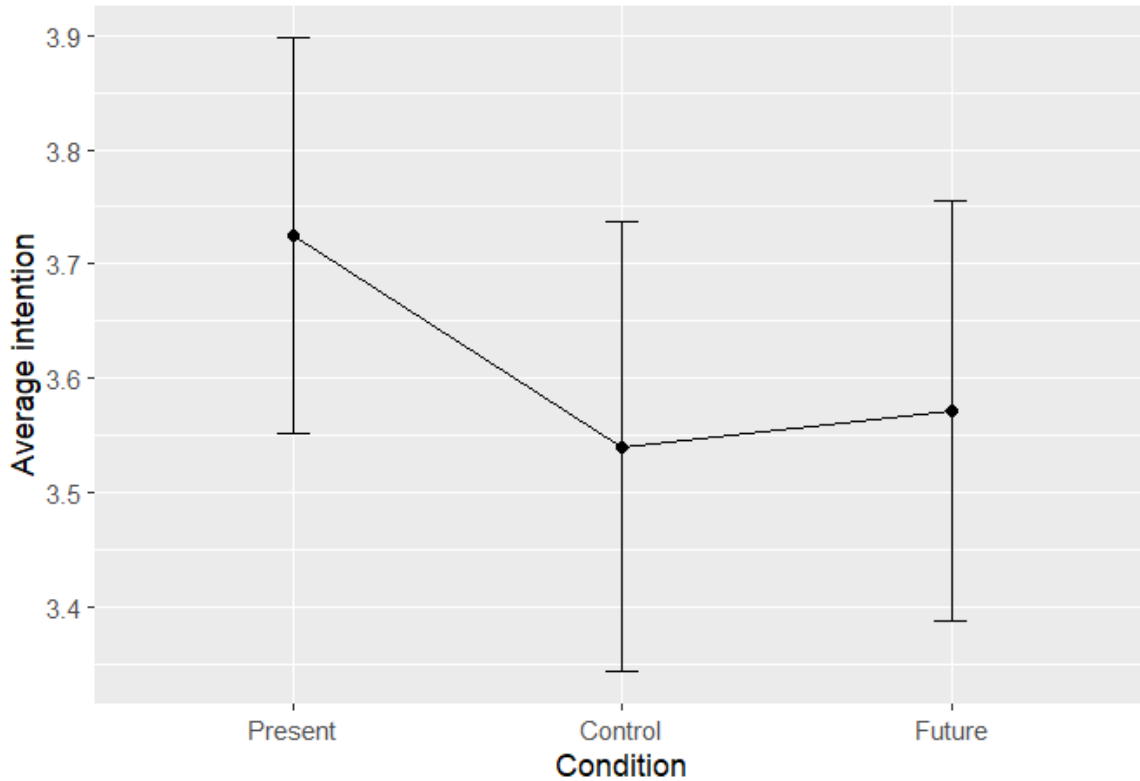
	<i>N</i>	<i>M</i>	<i>SD</i>
Present	209	3.72	1.27
Control	205	3.54	1.43
Future	184	3.57	1.26

*Note:* Labels present, control, and future represent the corresponding conditions, respectively.

<sup>5</sup> If the control group participants were filtered out by the same procedure as participants in the experimental groups, the quadratic effect would be statistically significant. For details, see Appendix no. 4.

**Figure 5**

*Pro-environmental intention by conditions in the whole sample*



*Note:* Points and error bars capture the means and 95% CI, respectively. Present, control, and future are the indications of conditions. Average intention is the mean of pro-environmental intention calculated for each of the conditions, respectively.

### 3.3.2 Secondary Hypotheses

**Effects of manipulation on facets of CFC.** Future priming did not increase CFC-F in the experimental group future,  $M = 3.51$ ,  $SD = 0.68$ , as compared to the control group,  $M = 3.54$ ,  $SD = 0.71$ ,  $t(385.45) = 0.46$ ,  $p = .647$ . As such, H3 was not supported. Immediate-priming did not decrease CFC-F in the experimental group present,  $M = 3.71$ ,  $SD = 0.58$ , as compared to the control group,  $M = 3.54$ ,  $SD = 0.71$ ,  $t(394.5) = 2.59$ ,  $p = .01$ . Thus, H4 was not supported.

Future-priming did not decrease CFC-I in the experimental group future  $M = 3.14$ ,  $SD = 0.66$ , compared to the control group  $M = 3.21$ ,  $SD = 0.84$ ,  $t(380.35) = 0.92$ ,  $p = .356$ . Based on the results, H5 was not supported. Immediate-priming did not increase CFC-I in the immediate-priming group,  $M = 3.21$ ,  $SD = 0.64$ , as compared to the control group  $M = 3.21$ ,  $SD = 0.84$ ,  $t(383.7) = 0.076$ ,  $p = .940$ . As such, H6 was not supported

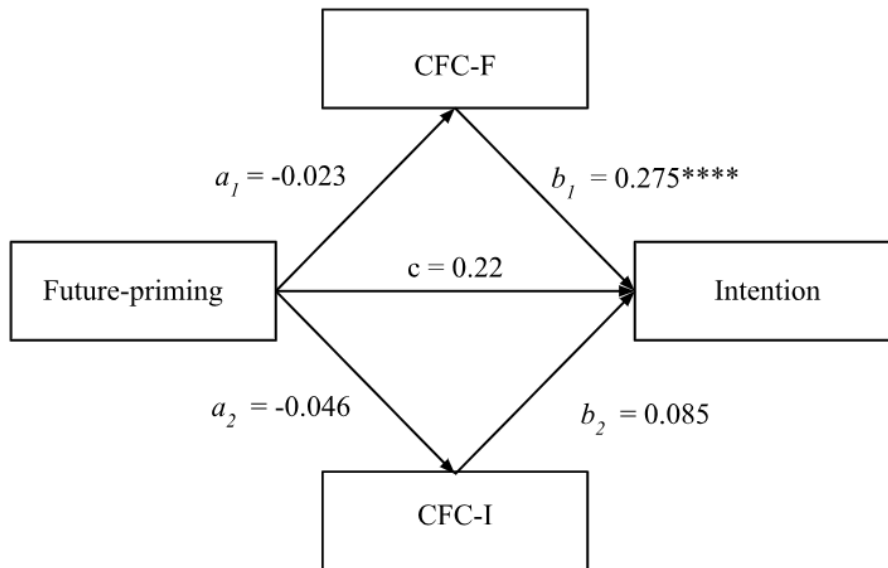
**Effects of manipulation on pro-environmental intention.** Future-priming did not increase average pro-environmental intention in the experimental group future,  $M = 3.57$ ,  $SD = 1.27$ , compared to the control group,  $M = 3.54$ ,  $SD = 1.43$ ,  $t(386.9) = -0.23$ ,  $p = .817$ . H7 was not supported. Immediate-priming did not decrease average pro-environmental intention in the experimental group present,  $M = 3.72$ ,  $SD = 1.27$ , compared to the control group,  $M = 3.54$ ,  $SD = 1.43$ . Based on these results, H8 was not supported.

*T*-tests did not reveal any expected effects of particular primings on pro-environmental intention or facets of CFC. Future or immediate priming did not shift CFC-F, CFC-I, or pro-environmental intention.

### **3.3.3 Parallel Mediation**

**Mediation effect - future-priming.** The mediation model for future-priming with CFC-C and CFC-F as mediators revealed that only the b1 path from CFC-F to pro-environmental intention was statistically significant,  $\beta = 0.275$ ,  $p < .001$ , all other effects were statistically insignificant (see Figure 6 for details). This means that we only found the theoretically expected correlation between intention and CFC-F but no direct or indirect effect of future priming. As such, H9 was not supported.

**Figure 6**  
*Future-priming mediation model*



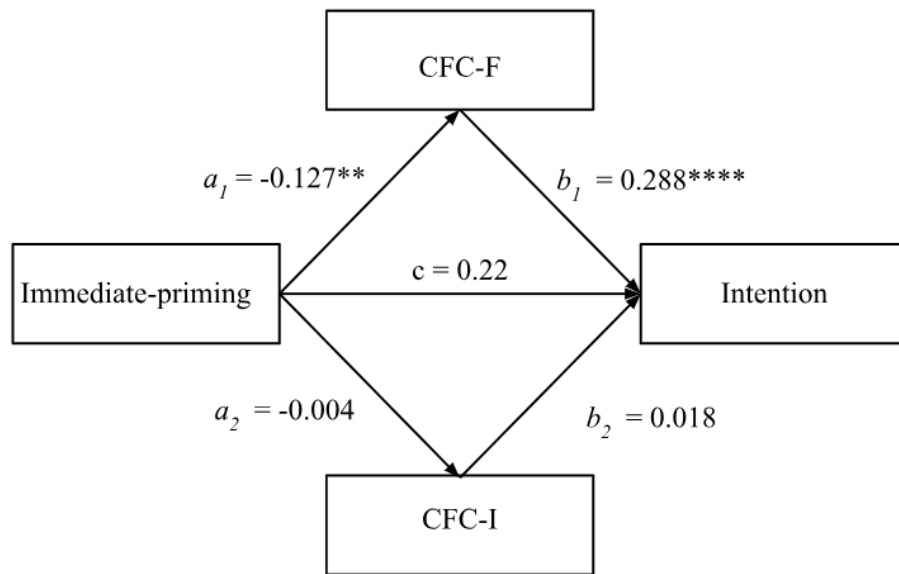
Indirect effect  $ab_1 = -0.006$   
 Indirect effect  $ab_2 = -0.004$   
 Total effect = 0.012

*Note:* This figure reports standardized regression coefficients from the mediation analysis. \*\*\*\*  $p < .001$ , \*\*  $.01 > p > .001$ , \*  $.01 < p < 0.05$ . Future-priming is the future manipulation, CFC-F and CFC-I are facets of CFC, respectively. Intention is the pro-environmental intention. Estimated coefficients  $a$ ,  $b$ , and  $c$  are standardized regression coefficients estimated in the mediation model. Coefficients  $ab_1$  and  $ab_2$  are the two indirect effects mediated by CFC-F and CFC-I respectively. The total effect represents the overall relationship between future-priming and pro-environmental intention.

**Mediation effect - immediate-priming.** The mediation model for immediate-priming with CFC-C and CFC-F as mediators revealed that the statistically significant  $a_1$  path from immediate-priming to CFC-F,  $\beta = -1.027, p = .009$ , and the statistically significant  $b_1$  path from CFC-F to intention,  $\beta = 0.288, p < .001$ . All other effects were statistically insignificant (see Figure 7 for details). This means that we found the indirect effect of immediate priming on pro-environmental intention mediated by CFC-F, but no direct effect or indirect effect of CFC-I. As such, H10 was supported.

**Figure 7**

*Immediate-priming mediation model*



Indirect effect  $ab_1 = -0.036$   
Indirect effect  $ab_2 = -0.000$   
Total effect = -0.068

*Note:* This figure reports standardized regression coefficients from the mediation analysis.

\*\*\*\*stands for sig. level 0.000; \*\*\* for sig. level 0.001; \*\*for sig. level 0.01; \* for sig. level 0.05. Immediate-priming is the immediate manipulation, CFC-F and CFC-I are facets of CFC, respectively. Intention is the pro-environmental intention. Estimated coefficients  $a$ ,  $b$ , and  $c$  are standardized regression coefficients estimated in the mediation model. Coefficients  $ab_1$  and  $ab_2$  are the two indirect effects mediated by CFC-F and CFC-I respectively. The total effect represents the overall relationship between immediate-priming and pro-environmental intention.

**Attention check.** On average, 34% of the participants did not pass the attention check. However, this proportion was much larger in the experimental group present (70%) than in the experimental group future (11%) and the control group (19%). In the control group with immediate-priming 28% of the participants did not answer correctly while in the control group with future-priming it was only 11%. Even though the true reason for people failing attention check massively in the experimental group future and the control group with future-priming is difficult to establish post-hoc, we think that it may be due to the future-like orientation of the measurements of CFC and the pro-environmental intention. This is evident



in the fact that participants primed with the future-priming (in the experimental and control group) scored higher in the attention check (11%) than participants primed with the immediate priming (57%). As such we think that the attention check probably overestimates the attention check failure in the experimental group present and the control group with immediate-priming. The difference between the experimental groups present and the control group with immediate-priming is most likely created by the placement of the attention check in the questionnaire (see Figure 1), when participants who filled out the attention check right after the manipulation scored higher in it.

### **3.4 Discussion**

In the main study, we failed to find the statistically significant global effect of prospect-concept priming on CFC and pro-environmental intention. However, the exploratory analysis of H1 and H2 suggested that after the exclusion of the first and the last quartile of participants sorted by time, both effects were statistically significant. Nevertheless, these effects were in the same directions as corresponding effects in the primary hypotheses testing, which is contrary to the pilot study and study by Arnocky et al. (2014). Based on these results, we propose that priming the time perspective is more complex and could be affected by other boundary conditions, such as priming duration or attention of the participants. We also found no effects of specific primings on facets of CFC or pro-environmental intention.

The mediation analysis revealed only an indirect effect of immediate-priming on pro-environmental intention mediated by CFC-F. However, we suggest that the mediation can be spurious (Fiedler et al., 2011; for details, see Chapter 4.2).

## **4. General Discussion**

The aim of this study was to test for the potential causal effect of time perspective on pro-environmental behavior. To shed more light on this problem, we conducted a conceptual replication of a study by Arnocky et al. (2014, Study 2). We conducted a pre-registered pilot study ( $N = 271$ ) on a convenience sample of Czech students and a larger pre-registered study ( $N = 598$ ) on a sample representative of the general adult Czech population.

Across the two studies, we found very weak evidence of the total experimental effect of the prospect-concept priming on consideration of future consequences (theoretical

mediator; this effect reached marginal statistical significance only in the pilot study) and pro-environmental intention (we found no statistically significant effects in either of the two studies). However, the main study revealed an indirect effect of prospect-concept priming on environmental intention mediated by consideration of future consequences (specifically, CFC-F). We will return to the discussion of this effect later.

#### **4.1 Failure of the Prospect Priming Manipulation**

Across our studies, we lack empirical evidence of the causal effect of prospect-concept priming on CFC and pro-environmental intention. Our results suggest that the manipulation was not successful or that the effect might be very small.

We expected that the failure of the manipulation could be caused by a methodological error in the reduction of priming time duration (see Chapter 4.5). This explanation is also supported by the results of the exploratory analysis, which revealed that after the exclusion of the first and last quartiles of participants sorted by time, the effects of manipulation on CFC and pro-environmental intention were statistically significant.

However, this possible explanation does not clarify the opposite effect of the manipulation on CFC that we found in the exploratory analysis and that is contrary to the Pilot study and the literature (Arnocky et al., 2014; Zimbardo & Boyd, 1999). The effect of manipulation on pro-environmental intention does not correspond with the expected distribution of means of pro-environmental intention (Arnocky et al., 2014) across the conditions as well.

#### **4.2 Indirect Effect of Prospect Priming on Pro-Environmental Intention**

The mediation test for future-priming on pro-environmental intention revealed no direct or indirect effects of future-priming on pro-environmental intention. We only found a theoretically expected positive association between CFC-F and pro-environmental intention.

The mediation test for immediate-priming on pro-environmental intention found a statistically significant indirect effect of the manipulation through CFC-F. In other words, immediate-priming decreased CFC-F which therefore decreased the pro-environmental intention. Literature shows that the insignificant total effect does not prevent us from interpreting the indirect effects (O'Rourke & MacKinnon, 2018). Thus, we discovered no direct effect or indirect effect through CFC-I, resulting in the indirect-only (complete)

mediation (Fiedler et al., 2018; Hair et al., 2021; Meule, 2019).

On the other hand, the indirect effect of immediate-priming on pro-environmental intention mediated by CFC-F may be a spurious mediation caused by other measured or unmeasured mediators or by already-existing non-manipulated associations in the data (Fiedler et al., 2011; Yeager & Krosnick, 2017). Additionally, we argue that this effect might be spurious based on the inconsistent results across our studies and Arnocky et al.' (2014) study.

### **4.3. Practical Implications**

Arnocky et al. (2014) argued that their results indicate that sustainable initiatives should focus more on reducing the immediate considerations rather than focusing on future-oriented aspects of awareness campaigns.

Our study cannot support these claims and, in addition, if the mediation effect is not spurious, we suggest that it would be easier to use prospect-concept priming to decrease pro-environmental behavior. Furthermore, it may generally be more challenging to enhance the future-oriented mindset than the present-oriented one.

### **4.4 Theoretical Implications**

Based on our results it seems that the manipulation of time perspective is a complex process. In our studies, we were not able to prove the causal effect of prospect-concept priming on CFC and pro-environmental intention. However, after the exclusion of the first and the last quartile of participants (those who were highest and lowest in priming-task duration), we identified statistically significant effects.

Cheng et al.'s (2012) experimental manipulation found a much stronger effect size of the manipulation on FTP of ZTPI ( $\eta_p^2 = 0.2$ ) than our main study discovered on CFC ( $\eta_p^2 = 0.0099$ ,  $p = .051$ ). Arnocky et al.'s study found a medium effect ( $d = .51$ ) of prospect-concept priming on CFC-I and no effect on CFC-F. Our pilot study found marginally statistically significant and small effect of prospect-concept priming on CFC,  $d = .19$ . However, the direction of the effects in Cheng et al. (2012), Arnocky et al. (2014) and our pilot study were the same. Only the direction of our exploratory analysis in the Main Study was the opposite.

Based on these comparisons, we argue that there are more (possibly so far unknown)

boundary conditions of prospect-concept priming, such as priming duration or attention of the participants.

#### **4.5 Limitations and Venues for Future Research**

The first limitation of our study is the change of the setting from laboratory conditions to an online setting. This resulted in more limited control over the conditions of the experiment, however, the literature shows that online environments often carry out the same results as studies conducted in laboratories (Huber & Gajos, 2020; Prissé & Jorrat, 2022; Schidelko et al., 2021). Nevertheless, the methodological error might be in the reduction of the priming duration from three minutes to a minimum of thirty seconds. We shortened the priming task in order to limit the drop-out and limit the proportion of participants who could do unrelated actions (e.g., surfing the internet) instead of paying attention to the priming task. It is difficult to evaluate this post-hoc, however, we performed the exploratory analysis where we filtered out the participants based on time, resulting in statistically significant effects of prospect-concept priming on CFC and pro-environmental intention.

Nonetheless, these effects were in the opposite direction than expected by the literature (Cheng et al., 2012; Arnocky et al., 2014) and our Pilot study. Given that we suspected technical errors, but we ruled those out (for the technical troubleshooting procedure, see Appendix no. 2). We think that this effect might have a more substantial interpretation.

We also ruled out that our study lacked internal validity as we were able to observe many theoretically expected relationships between variables. The exploratory analysis confirmed the validity of the CFC measure by finding a positive association between CFC and pro-environmental intention,  $r = .197$ , which is consistent with the previous research. (For instance, Joireman et al. (2001) found a moderate correlation of  $r = .26$  between pro-environmental intention and CFC, and the meta-analysis by Milfont et al. (2012) showed a moderate correlation of  $r = 0.26$  between future time perspective and pro-environmental behavior.) The validity of the pro-environmental intention measure was supported by the exploratory analysis that found a positive moderate association between pro-environmental intention and environmental self-identity,  $r = .47$ . This result is consistent with the literature, for example, Lalot et al., (2019) found a moderate correlation of  $r = .41$  between

environmental self-identity and personal AC-use intention and a moderate correlation of  $r = .63$  between self-identity and general pro-environmental intention.

To conclude, we did not find the causal evidence of time perspective on pro-environmental intention, specifically, prospect-concept priming did not causally influence pro-environmental intention. We explain this by a probably only very small effect of prospect-concept priming in web-based studies like ours.

Based on these results, we propose that further research is needed to fully understand the effects of prospect-concept priming on CFC, its facets, and pro-environmental intention. Other studies should try to bring more causal evidence of time perspective on pro-environmental behavior. The other important and not-yet-examined factor is the boundary conditions of the manipulation.

We suggest that the follow-up studies could be conducted in a laboratory in order to achieve stronger effects of prospect-concept priming. We also propose that in the online setting, the manipulation task should be longer.

## **Conclusion**

This thesis examines the causal role of time perspective (consideration of future consequences) on pro-environmental intention. Specifically, we conducted a pre-registered web-based randomized experiment on a representative sample ( $N = 598$ ) of the Czech adult population. We manipulated future and immediate time perspectives using prospect-concept priming and measured people's pro-environmental intention.

Our studies failed, by and large, to experimentally manipulate time perspective and therefore their results should be interpreted with caution. In any case, we were not able to replicate the causal effect of time perspective on pro-environmental behavior observed in the previous study (Arnocky et al., 2014). These results suggest that the prospect-concept priming procedure is less efficient than previously thought and/or subject to unknown boundary conditions. Nevertheless, the exploratory analysis hints that the duration of the priming task or the attention of the participants could influence the prospect-concept priming. These results may also suggest that the causal effect of time perspective on pro-environmental intention (and behavior) is weaker than previously thought.

These results contribute not only to the literature on the role of time perspective in pro-environmental behavior but--more broadly--also to the sociological theorizing about the

role of temporality in human behavior.

## Summary

Tato práce zkoumá kauzální vliv časové perspektivy (časového zaměření na budoucí důsledky) na proenvironmentální záměry. Konkrétně jsme provedli pře-registrovaný webový randomizovaný experiment na reprezentativním vzorku ( $N = 598$ ) české dospělé populace. Manipulovali jsme s budoucí a bezprostřední časovou perspektivou pomocí prospektivně-koncepčního primingu a měřili jsme proenvironmentální záměr lidí.

V našich studiích se většinou nepodařilo experimentálně manipulovat s časovou perspektivou, a proto je třeba jejich výsledky interpretovat s opatrností. V každém případě se nám nepodařilo zopakovat kauzální vliv časové perspektivy na proenvironmentální chování pozorovaný v předchozí studii (Arnocky et al., 2014). Tyto výsledky naznačují, že procedura prospektivně-koncepčního primingu je méně účinná, než se dříve předpokládalo, a/nebo podléhá neznámým okrajovým podmínkám. Nicméně exploratorní analýza naznačuje, že trvání primingu nebo pozornost účastníků by mohly mít vliv na prospektivně-koncepční priming. Tyto výsledky mohou také naznačovat, že kauzální vliv časové perspektivy na proenvironmentální záměr (a chování) je slabší, než se dříve předpokládalo.

Tyto výsledky přispívají nejen k literatuře o úloze časové perspektivy v proenvironmentálním chování, ale--v širším smyslu--také k sociologickému teoretizování o úloze časovosti v lidském chování.

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## **Appendices**

### **Appendix no. 1: Analytic Formulation of the Hypotheses**

#### **Main hypotheses.**

H1: Participants in the control group have higher compound CFC score than participants in the experimental group present and lower compound CFC score than participants in the experimental group future.

H2: Participants in the control group have higher pro-environmental intention score than participants in the experimental group present and lower pro-environmental intention score than participants in the experimental group future.

#### **Secondary hypotheses.** Specific effects of priming on the two facets of CFC:

H3: Participants in the experimental group future have higher CFC-Future score than participants in the control group.

H4: Participants in the experimental group present have lower CFC-Future score than participants in the control group.

H5: Participants in the experimental group future have lower CFC-Immediate score than participants in the control group.

H6: Participants in the experimental group present have higher CFC-Immediate score than participants in the control group.

#### Specific effects of future and immediate priming on pro-environmental intention:

H7: Participants in the experimental group future have higher pro-environmental intention score than participants in the control group.

H8: Participants in the experimental group present have lower pro-environmental intention score than participants in the control group.

#### **Parallel mediation.**

H9: CFC-Future, CFC-Immediate, or both mediate the effect of future-priming (experimental group future) on pro-environmental intention.

H10: CFC-Future, CFC-Immediate, or both mediate the effect of immediate-priming (experimental group present) on pro-environmental intention.



## **Appendix no. 2: Troubleshooting**

First of all, we checked the coding of CFC and intention in the questionnaire with the proposed coding. Next, we checked if the participants received the correct manipulation texts. Manipulation texts were loaded inside of variables MPT (manipulation present treatment), MFT (manipulation present treatment), MPC (manipulation present control), and MFC (manipulation future control). These variables had relevant equations based on the variable `rand` which guaranteed their display only to relevant groups. Since these variables were just displaying texts they did not have any values. However, we could investigate the time participants spend on every question (loaded in variables `variableNameTime`, eg., `MPTTime`). First of all, we double-checked if every text-display variable consists of the correct corresponding text (e.g., MPT of immediate-priming). Next, we created a subset consisting of variable `rand` and text-display variables. We double-checked if the participants spent time in the correct priming based on their treatment group membership.

Next, we inspected if the means were calculated right. We used various functions to calculate the CFC means and we also used all of the variables that were relevant for manipulation coding (`rand`, `manipType`, `manipTypeFactor`). All of the calculated means were the same.

Last but not least, we checked if the reverse coding of CFC was done correctly according to the theory. We also investigated if the reverse coding was put in the data transformation part of the script before CFC was used in the analysis.

To scrutinize the attention check, we double-checked the recoding of original answers in the original variable `attentionCheck` into the new variable `attentionChoice` which used the manipulation coding. After that, we inspected the creation of variable `priming` which was designed to determine if the participants underwent immediate or future-priming, no matter their membership in control or experimental groups. Specifically, we checked if the variable `priming` had the value of `manipType` for experimental groups and the values of `manipCont` for the control group. In the end, we looked into the evaluation of the attention check - variable `sensitivityCheck`, which is a boolean created by logical comparison of variable `priming` and `attentionChoice`. To conclude, we did not find any mistakes in the methodology or in the analytic script.

## Appendix no. 3: Institutional Review Board of the Charles University Environment Centre



Centrum pro otázky  
životního prostředí  
Univerzita Karlova v Praze



### **Schválení návrhu výzkumného projektu *Etickou komisí pro výzkum při Centru pro otázky životního prostředí Univerzity Karlovy* / Approval of the Research Project Proposal by Institutional Review Board of Charles University Environment Centre**

#### **Název projektu / Title of the project:**

Časové perspektivy, motivovaná kognice a proenvironmentální chování / Time perspectives, motivated cognition and pro-environmental behaviour

**Navrhovatel/ Applicant:** Jan Urban

**Číslo návrhu projektu / Project proposal number:** 2/2024

Datum podání žádosti / Date of project proposal submission: March 7, 2024

Jménem *Etické komise pro výzkum při Centru pro otázky životního prostředí Univerzity Karlovy* (IRB) potvrzujeme schválení výše zmíněné studie IRB. Tento výzkum musí být realizován v souladu s předloženým návrhem projektu, tedy v souladu s předloženým výzkumným plánem a materiály popsány v návrhu. Jakékoli podstatné změny ve studii vyžadují dodatečné schválení IRB před tím, než budou v této studii realizovány.

On behalf of *Institutional Review Board of Charles University Environment Centre* (IRB), we hereby certify that the abovementioned study has been approved by IRB. All research must be conducted in accordance with the approved submission, meaning that the study must be carried out using the research plan and materials outlined in the submitted proposal. Any substantial changes to the study require additional approval from IRB before they can be implemented.

*Za Etickou komisí pro výzkum při Centru pro otázky životního prostředí Univerzity Karlovy,*

*For Institutional Review Board of Charles University Environment Centre,*

*Jméno / Name:* Vojtěch Máca

*Datum / Date:* April 4, 2024

*Podpis / Signature:*

#### Appendix no. 4: Sensitivity check of the time-filtering process

Different group sizes in *ANOVA* testing can affect the statistical power of this test. However, since time spent in the priming task does not influence the results of pro-environmental intention and CFC in the control group (see Figure 1), we decided not to filter out these participants in the main exploratory analysis in the exploratory analysis. Nevertheless, we decided to conduct a sensitivity analysis to look at the results after performing the same exclusion process on the control group as in the experimental groups (see the exploratory analysis section of chapter Analysis). The results in global effects did not differ across the exploratory analysis, however, we found a statistically significant quadratic effect of prospect-concept priming on pro-environmental intention.

After the filtering process, 300 participants entered this non-registered analysis ( $N_{\text{present}} = 105$ ,  $N_{\text{control}} = 103$ ,  $N_{\text{future}} = 90$ ).

*ANOVA* for H1 revealed the statistically significant effect of prospect-concept priming on CFC,  $F(1, 296) = 4.503$ ,  $p < .05$ . We found a statistically significant linear effect as well,  $F(1, 296) = 7.186$ ,  $p < .01$ . The quadratic effect was not statistically significant,  $F(1, 296) = 1.820$ ,  $p = .178$ . The distribution of means can be found in Table 3.

**Table 3**

*CFC by conditions in the reduced sample*

	<i>N</i>	<i>M</i>	<i>SD</i>
Present	105	3.49	0.48
Control	103	3.30	0.65
Future	92	3.28	0.48

*Note:* Labels present, control, and future represent the corresponding conditions, respectively.

*ANOVA* for H2 revealed the statistically significant effect of prospect-concept priming on pro-environmental intention,  $F(1, 296) = 4.378$ ,  $p < .05$ . We did not find the linear effect,  $F(1, 296) = 6.123$ ,  $p = .065$ . The quadratic effect was statistically significant,  $F(1, 296) = 5.338$ ,  $p < .05$ . The distribution of means can be found in Table 4.

**Table 4**

*Pro-environmental intention by conditions in the reduced sample*

	<i>N</i>	<i>M</i>	<i>SD</i>
Present	105	3.97	1.29
Control	103	3.42	1.44
Future	92	3.63	1.28

*Note:* Labels present, control, and future represent the corresponding conditions, respectively.

## **Appendix no. 5: SZZ Sociologie**

### **Vybraná témata k okruhům SZZ ze Sociologie**

Okruh 2: POJMY

Klíčové slovo: Jednání

Okruh 4: PROCESY

Klíčové slovo: Globalizace

Okruh 5: IDENTITY

Klíčové slovo: Environmentální identita

### **Seznam literatury ke SZZ ze Sociologie**

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## **Appendix no. 6: SZZ Metodologie**

### **Vybraná témata k okruhům SZZ z Metodologie**

Okruh 1: Teoretická východiska výzkumu

Téma: Kvantitativní výzkum:

- Formulace výzkumných otázek, teoretické konstrukty a hypotézy

Okruh 2: Příprava a organizace výzkumu

Téma: Kvantitativní výzkum:

- Typy a příprava experimentů, metodologické a etické aspekty experimentálních studií

Okruh 3: Vytváření a sběr dat

Téma: Kvantitativní výzkum:

- Metody sběru dat (CAWI, CATI, PAPI). Online dotazování. Online panely a jejich kritika.

Okruh 4: Analýza dat

Téma: Kvantitativní výzkum:

- Příprava dat pro analýzu (transformace a čištění)

Okruh 5: Reflexivita, etika a prezentace výzkumu

Téma: Kvantitativní výzkum:

- Interpretace statistické a věcné významnosti výsledku

### **Seznam literatury ke SZZ z Metodologie**

1. Bronner, F., & Kuijlen, T. (2007). The Live or Digital Interviewer—A Comparison between CASI, CAPI and CATI with Respect to Differences in Response Behaviour. *International Journal of Market Research*, 49(2), 167–190. <https://doi.org/10.1177/147078530704900204>
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## **Appendix no. 7: SZZ Studia současných společností**

### **Téma SZZ ze specializace Studia současných společností**

Téma: Konzumerismus a zelená spotřeba: vliv časovosti na spotřebitelské uvažování, perspektiva pro-environmentálního chování

Navazuje na předmět/y: Spotřeba a společnost

### **Seznam literatury ke SZZ ze specializace Studia současných společností**

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## **Appendix no. 7: Teze bakalářské práce:**

### **Projekt bakalářské práce**

Jméno a příjmení studujícího: Lukáš Stropnický

Studijní program: Sociologie se specializací Studia současných společností

Předpokládaný název práce: **Impact of consideration of future consequences on environmental intentions**

Klíčová slova v angličtině: consideration of future time consequences, pro-environmental behavior, pro-environmental intention, time perspective

Vedoucí práce: Mgr. Jan Urban, Ph.D.

Jméno vedoucí/ho bakalářského / diplomového semináře, do kterého se chce studující hlásit (předběžně): Mgr. Tomáš Dvořák, Ph.D.

### **Námět práce/ Topic**

In this bachelor thesis, I aim to experimentally study the causal effect of a person's time perspectives (consideration of future consequences, CFC) on his or her engagement in pro-environmental behavior. While several studies demonstrated the statistical association between CFC and pro-environmental behavior (Arnocky et al., 2014; Wang et al., 2019), none of the existing studies demonstrated a causal effect of CFC on pro-environmental intentions. Several studies also showed that people's attitudes to the future can be experimentally manipulated (Arnocky et al., 2014; Rabinovich et al., 2010; Zaval et al., 2015) but none of these studies show that such manipulations alter people's average CFC scores. This study will build on the two types of literature and will attempt to unravel the causal effect of a person's time perspective on his or her pro-environmental behavior.

Several experimental studies manipulated people to increase their pro-environmental behavior. The first approach was presented by Tate et al. (2014). For the manipulation, they used a priming method consisting of a text with particular facts about the overproduction of waste in the United Kingdom and its negative impact on the environment. Another approach was examined by Zaval et al. (2015). They used the concept of legacy motives. As a priming



method, they utilized a short writing task about how the respondents want to be remembered by future generations. Yet another approach was used by Rabinovich et al. (2010). They directly asked the respondents to describe what they think the environmental situation will look like in a month or in ten years. Finally, as presented by Arnocky et al. (2014), the consideration of future consequences can be manipulated by giving the respondents short reading tasks that make them think about their typical day in the present or in four years. This manipulation of time perspectives will be used in this study.

The first type of literature that this thesis will build on examines the consideration of future consequences (Arnocky et al., 2014; Strathman et al., 1994) and similar constructs. Consideration of future consequences as first presented by Strathman et al. (1994) is a construct that refers to the changing of people's behavior while considering the possible events and outcomes in the future. It is affected by a dilemma of considering the immediate costs associated with embracing pro-environmental behavior (e.g. saving water, recycling). It is observed that future time perspective plays an important role in sustainable behavior by increasing pro-environmental behavior more than past or present time perspectives (Arnocky et al., 2014). However, there are no studies that examined the effect of time perspectives on pro-environmental intentions.

The second type of literature review observes the concept of pro-environmental behavior with a focus on pro-environmental intentions. As stated by Minton and Rose (1997) the pro-environmental behavioral intentions can be influenced by the effect of environmental concern, by personal norms, or partially by injunctive norms that had the lowest effect. The general pro-environmental behavior was also overall influenced by all of these three factors but with different intensities than in the case of pro-environmental intentions. Nevertheless, Minton's and Rose's (1997) concept of pro-environmental intentions was never tested in the context of consideration of future consequences.

The main goal of this bachelor thesis aims to lead to further clarification of the causal effect of the consideration of future consequences on pro-environmental behavior while connecting the concept of CFC manipulation and pro-environmental intentions. Only several studies examined the topic of people's attitudes to the future and pro-environmental behavior and none of these studies demonstrated the effect of manipulation of CFC on the pro-environmental intentions experimentally. There are also no studies examining this topic in

the context of the Czech Republic. This thesis aims to use Arnocky et al. (2014) priming task and to test the effect of this manipulation on the pro-environmental intentions measured on the pro-environmental behavioral intention scale taken from Minton and Rose (1997).

### **Předpokládané metody zpracování/ Planned methods**

This thesis will be based on an experimental study (randomized experiment). I will use Arnocky et al. (2014) approach to manipulate participants' time frames. The study will use a manipulation check (12-item CFC scale adopted from Strathman et al., 1994; the Czech version is adopted from Urban and Vačkářová, 2020). An example of an item: "I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date." The scale captures how focused on the future or on the present participants are by asking them to rate how characteristic the presented statements were on a five-point scale (1 = *extremely uncharacteristic*, 5 = *extremely characteristic*).

I will use the pro-environmental intention scale adopted from Minton and Rose (1997); the Czech version is available in Urban et al. (2021). Each item depicted a hypothetical situation where a respondent had an opportunity to engage in environmentally-friendly behavior. An example of an item: "I would be willing to sign a petition to support an environmental cause." Participants indicate their answers on a seven-point Likert scale (1 = *completely disagree* 6 = *completely agree* ).

I will recruit a convenience sample of Czech-speaking adults using snowball sampling for my study. I will determine the sample size needed using power simulation.

In my work, I will propose and test the following hypotheses.

H1: Participants in the experimental group future have higher average CFC scores than those in the control condition (manipulation check).

H2: Participants in the experimental group future have higher average pro-environmental intention scores than those in the control condition.

To test both hypotheses, I will use independent-sample *t*-tests (one-sided, alpha = .05).

Together with my classmates and the supervisor, we have conducted a pilot study. This study ( $N_{total} = 271$  respondents,  $N_{control} = 151$  respondents,  $N_{experimental} = 120$  respondents) revealed a small effect of time frame manipulation of CFC ( $d = 0.14$ ,  $p > .05$ ) and a negligible effect on environmental intention ( $d = 0.19$ ,  $p > .05$ ; for details, see <https://doi.org/10.17605/OSF.IO/NFPZ3>).

### **Etické souvislosti zvažovaného projektu/ Ethical context of the prospective project**

The study has a negligible risk for participants comparable to Internet browsing and office work. The manipulation of CFC has only a short-term effect. No personal or sensitive data will be collected. All data will be anonymous.

The study will be reviewed by the Institutional review board of the Charles University Environment Center.

### **Orientační seznam literatury/ References**

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