PUBLICACIÓN ANTICIPADA EN LÍNEA *(Versión previa a la diagramación). La Revista Tesis Psicológica informa que este artículo fue evaluado por pares externos y aprobado para su publicación en las fechas que se indican en la siguiente página. Este documento puede ser descargado, citado y distribuido, no obstante, recuerde que en la versión final pueden producirse algunos cambios en el formato o forma.*

tesis Psicológica
Revista de la Facultad de Psicología

The future that we are leaving behind: An experimental online study about intergenerational sustainability dilemmas[1].

El futuro que estamos dejando atrás: Un estudio experimental en línea sobre los dilemas de sostenibilidad intergeneracional.

Maria Victoria Ortiz[2]

Cecilia Reyna[3]

Recibido: Junio 15 de 2024 *Revisado: Junio* 20 de 2024 *Aprobado: Diciembre 09 de 2024*

Cómo citar este artículo: Ortiz, M.V. & Reyna, C. (2024). The future that we are leaving behind: An experimental online study about intergenerational sustainability dilemmas. *Tesis Psicológica*, 19(2), X-X. https://doi.org/10.37511/tesis.v19n2aX

Abstract

Threats such as climate change require people to make decisions that benefit future generations. Building on previous research, we evaluate intergenerational decisions in an experimental climate game in a sample of university students from

[1] Acknowledgments: This work was developed within the framework of a grant from the National Agency for the Promotion of Research, Technological Development and Innovation, awarded to the team coordinated by Dra. Cecilia Reyna (# PICT2018-2980) during the Ph.D. thesis of the main author. We would like to thank Dr. Robert Böhm for his kind help with the experimental setup and the LIONESS Lab support team who helped us with the game programming. We would also like to thank the members of our research team and the computer server team at the Universidad Nacional de Córdoba for their invaluable collaboration. Finally, and most importantly, a BIG THANK YOU to all the participants in this experiment who allowed us to carry out scientific research. The results of this work have already been presented at the International Conference on Social Dilemmas 2022 and in the thesis of the main author (Ortiz, 2024).

[2] IIPSI – Instituto de Investigaciones Psicológicas (CONICET – UNC). Facultad de psicología, Universidad Nacional de Cordoba. ORCID: https://orcid.org/0000-0002-5923-8107 Corresponding: mv.ortiz@unc.edu.ar

[3] Investigadora Independiente CONICET. Profesora Adjunta en Psicoestadística Descriptiva e Inferencial, Profesora Asistente en Metodología de la Investigación Psicológica, y Profesora Asistente en Introducción a la Psicología. Universidad Nacional de Córdoba. ORCID: https://orcid.org/0000-0002-6097-4961 Corresponding: ceciliareyna@unc.edu.ar

[details omitted for double-blind reviewing]. A total of 184 participants were exposed to one of four treatments and then played in groups or "generations" a round of the Multi-Level Conflict in Climate Change Mitigation developed by Böhm, Gürerk & Lauer (2020) with some variations. In addition, they completed some questionnaires. The results suggest that the treatments did not work as expected, i.e. there was no increase in long-term contributions for exposure to the experimental treatments compared to the control, nor among the treatments. On average, 25% of participants contributed 15 points to the long-term pool, which is the intergenerational optimum to benefit the next generation. This indicates a low percentage of cooperation with the future in general. Those who contributed most to the long-term pool were ideologically self-positioned on the left and had a higher perception of the social risk of climate change. Although the results did not provide evidence to support the hypothesis, this study sheds light on the pros and cons of the proposed methodology and makes visible an issue that has not been extensively studied in the Latin American context, namely concern for the future.

Keywords: Intergenerational sustainability dilemmas, cooperation, future generations, experiment

Resumen

Amenazas como el cambio climático requieren que las personas tomen decisiones en beneficio de las generaciones futuras. Basándonos en investigaciones previas, evaluamos las decisiones intergeneracionales en un juego climático experimental en una muestra de estudiantes universitarios de [details omitted for double-blind reviewing]. Un total de 184 participantes recibieron uno de los cuatro tratamientos y luego jugaron en grupos o «generaciones» una ronda del juego del Conflicto multinivel en la mitigación del cambio climático desarrollado por Böhm et al. (2020) con algunas variaciones. Además, completaron algunos cuestionarios. Los resultados sugieren que los tratamientos no funcionaron como se esperaba, es decir, no hubo un aumento de las contribuciones a largo plazo por la exposición a los tratamientos experimentales en comparación con el control, ni entre los tratamientos. Además, el 25% de los/as participantes contribuyó con 15 puntos al pozo común a largo plazo, que es el óptimo intergeneracional para beneficiar a la siguiente generación. Esto indica un bajo porcentaje de cooperación de los/as participantes con el futuro en general. Quienes más contribuyeron al pozo de largo plazo se auto posicionan ideológicamente con la izquierda y tenían una mayor percepción del riesgo social del cambio climático. Aunque los resultados no aportaron evidencias que apoyen las hipótesis propuestas, este estudio arroja luz sobre los pros y contras de la metodología utilizada y visibiliza un tema poco estudiado en el contexto latinoamericano, como es la preocupación por el futuro.

Palabras clave: Dilemas intergeneracionales sustentables, cooperación, generaciones futuras, experimento

Introduction

Climate change is one of the most challenging global phenomena of our time (IPCC, 2023). As a complex and man-made issue, it should be analysed at different levels (Swim & Bloodhart, 2018). In particular, the group level of climate change has been scarcely studied (Pearson & Schuldt, 2018). Earlier work by Wade-Benzoni & Tost (2009) introduced the concept of “intergenerational dilemmas”. More recently, other researchers have proposed the concept of "intergenerational sustainability dilemmas" (Kamijo, Komiya, Mifune, & Saijo, 2017; Shahrier, Kotani & Saijo, 2017; Shahen, Masaya, Kotani, & Saijo, 2020). Such dilemmas are closely linked to the causes and consequences of climate change. For example, the consumption patterns of the current generations (e.g. fossil-fuelled, protein-rich diets) have pleasant short-term results.

However, they affect future generations by increasing emissions and environmental damage (e.g., Ivanova et al., 2016). In contrast to classical social dilemmas (Van Lange, Joireman, Parks & Van Dijk, 2013), unilateral decisions (of the current generations) and the impossibility of reciprocity (of the future generations) prevail (Wade-Benzoni & Tost, 2009).

Despite the lack of conclusive evidence in the literature (e.g., Inoue, Himichi, Mifune & Saijo, 2021), people do not often benefit future generations. For example, Jacquet et al. (2013) observed in a sample of 192 students at the University of Hamburg how cooperation is reduced when the reward for cooperation only benefits future generations and not oneself. Similarly, Hurlstone, Price, Wang, Leviston, and Walker (2020) observed the same trend among 180 university students in Australia. In a larger-scale study involving over 20,000 participants, Hauser, Rand, Peysakhovich, and Nowak (2014) showed that resources tend to be depleted quickly as they are passed down from one generation to the next. Additionally, in the study by Böhm et al. (2020) with a sample in Germany (N = 324), it was found that even if participants achieve a sufficient level of cooperation to not exceed a threshold, they contribute more to the short-term pool than to the more costly long-term pool in detriment of future generations.

As a result, researchers have investigated different strategies to foster intergenerational cooperation mostly using experimental game settings such us the Intergenerational Goods Game (IGG) (Hauser et al., 2014; Lohse & Waichman, 2020), the Intergenerational Sustainability Dilemma Game (ISDG) (Kamijo et al., 2017; Rajendra et al., 2019; Shahrier et al., 2017), the Multi-level Conflict Game in climate change mitigation (Böhm, et al. 2020). All these games are based on the Public Goods Game or the Common Pool Resources game, classic games in game theory for modelling behaviour. One mechanism to promote sustainable decisions proposed is to enable communication between generations of players, passing advice to their successors. Chaudhuri, Graziano & Maitra (2006) demonstrated that cooperation increases in a public advice treatment in contrast to a private advice. Another mechanism is negotiation. Previous research has found that the extraction from the common good was smaller when the next groups or generations had the option to decide democratically how much to extract (Hauser et al., 2014). Furthermore, negotiating with an imaginary future person enhances cooperation, i.e., when members of an imaginary future generation are present during negotiations, they tend to select more sustainable options (Kamijo et al., 2017). Lastly, simple interventions as nudges from Behavioural Economic discipline (e.g, the default option or commitment) or legacy induction enables cooperation with the future (Böhm et al., 2020; Hurlstone et al., 2020).

In the present study, we tested three different interventions to increase cooperation to the future, i.e., long-term pool contributions in the experimental game developed by Böhm et al, (2020), in contrast to a control condition without stimulus (T0). More specifically, the first treatment (T1) consisted of showing a photo of a chain that reflects the idea of continuity. Additionally, the following message was displayed: "We are a link in a chain that connects the present with the future". This treatment is similar to the one proposed by Hursltone et al., (2020) but instead of activating the legacy motive by linking the past to the future with a picture of a chain (from left top to bottom right) and a phrase and text passage, our proposal seeks to connect the present with the future, and the chain has a different disposition (from bottom left to right top). The second treatment (T2) consisted of the same picture and a message that T1 but we added a similarity task previously implemented by Meleady & Crisp (2017) and based on the classical psychological approaches of Social Identity Theory (Tajfel & Turner, 1986) and Social Categorization Theory (Turner et al., 1987): "Now, we would like you to take a few minutes (1 or 2 minutes) and think about 3-5 characteristics that people of present and future generations may have in common. Please write those characteristics below". Lastly, the third intervention consists of the same picture and message as the previous treatments, but we add an imagined contact task: "We would like you to take a few minutes (1 or 2 minutes) to imagine a meeting with a person of the future generation for the first time. Imagine that it is a positive, relaxed and comfortable interaction. Please write the details of the meeting here (for example: what would you say to that person, when and where do you imagine that interaction, etc.)". According to Pearson and Schuldt (2018), Contact Theory (Allport, 1954) has received remarkably little attention in the context of climate change but indirect forms of contact such as extended or imagined contact have potential to protect the most burden groups from environmental degradation. In sum, all the experimental conditions proposed had the intention to generate affinity to an outgroup, in this case, future generations (Wade-Benzoni, 2008).

Our main hypothesis relies on the differences in the individual contributions to the long-term pool. We expect higher contributions to the long-term pool in the experimental treatments than in the control (T1>T0; T2>T0; T3>T0) and we also expect higher long-term contributions in T3 than in T2 and T1 and in T2 than in T1 (T3>T2; T3>T1; T2>T1). Previous studies have shown that imagining similarities between generations (T2) encourages sustainable decision making (product choice) (Meleady & Crisp, 2017) and an encounter with an outgroup member or members (T3) encourages intentions and cooperation behaviour in a Prisoner's Dilemma Game (Meleady & Seger, 2017; Miles & Crisp, 2014). We predict that imagining an encounter with future generations (T3) could have a stronger effect than thinking about similarities with future generations (T2) and only watching a picture of a chain and a message that elicits the connection with the future (T1). Furthermore, we expect a higher percentage of individuals contributing 15 points or more at T1, T2 and T3 than at T0 (T1>T0; T2>T0; T3>T0). Based on Böhm et al. (2020), if each group member contributes 15 points to the long-term pool (intergenerational optimum), negative consequences for the next group are avoided. In addition, we explore whether individual differences in consideration of past generations, future consequences, perception of climate change risk, value orientation and ideological self-positioning affect contributions to the long-term pool in the experimental climate game.

This study contributes to climate change mitigation research by testing three treatments (message, similarity task, and imagined contact task) aimed at increasing affinity with future generations and promoting sustainable decision-making in the present. Although there has been an increase in the study of intergenerational dilemmas in recent years, it is still an underdeveloped area of research (Peters, 2017) and is even more in Latin American context. Chen, Wu & Luan (2023) suggest that how to promote intergenerational cooperation is a common challenge facing all countries in the world, but the findings cannot be directly extrapolated to different cultural groups. Furthermore, we have proposed some variations of the experimental game design of Böhm et al. (2020), which could enrich the methodological debate in this area.

This paper is structured as follows. The next section deals with the methodology of this study, explaining the design and the sample used. We then present the results and propose several explanations for the non-significant results in this research.

Method

Type and Design

We conducted a between-subjects online experiment. Participants were exposed to one of four different treatments (T0-T3), then completed a round of an experimental climate game as a group and answered several questionnaires individually. Most participants played the experimental game as members of the present generation (G1), others as members of the future generation (G2). A total of 39 online sessions were conducted for G1 participants. In addition, three further sessions were conducted with G2 players after two draws in which G1 and G2 participants were paired. G2 participants were not included in the analyses. G1 participants were exposed to one of the following four treatments: 48 participants in T0 or control; 45 participants in T1 or picture and sentence treatment; 46 participants in T2 or similarity treatment; 45 participants in T3 or imagined contact treatment.

Participants

University undergraduate students from the [details omitted for double-blind reviewing] in this study. To calculate the target sample size, we used G*power ; version 3.1.9.4 (Faul, Erdfelder, Lang & Buchner, 2007). For the novelty of the effect under study and the lack of studies that report the effect size related to this topic, we considered that a medium effect size of .25 would be of interest. Therefore, considering one way ANOVA statistical test with the following values and four treatments (T0, T1, T2, T3), an effect size f = 0.25, an alpha level = .05 and a power = .80, G*Power suggests a sample of 180 individuals (Partial n2 = 0.5). The final sample consisted of 184 university students between the ages of 18 and 29, considering only those belonging to G1. The participants were mainly female (82.1%) and lived in Córdoba during the study (83.7%). More than 60% of the participants were psychology students. In addition, 2.7% of participants reported having children and only a small percentage (16.8%) reported a strong commitment to environmental issues (e.g. previous experience in environmental projects at university or in NGOs).

Measures

Experimental game

The game was previously proposed by Böhm et al. (2020) and basically consists of choosing between contributing to a short-term pool, to a long-term pool or both. We have made some modifications to the original, which are detailed in Appendix A. Each member of each group (n = 3) makes their choice simultaneously and independently for each other. Their decisions have effect in their group of the present generation (G1) and in the following group of the future generation (G2). The initial endowments of G1 and G2 participants are different. Each participant of the G1 starts with an initial endowment of 30 tokens. The initial endowment of G2 participants depends on the decisions of G1 players. Participants can contribute any points from their initial endowment and the points they do not contribute to the pools are held in their private accounts. One of the most important aspects of the game is that long-term contributions are individually more costly (marginal per capita return, MPCR = 0.4) than short-term contributions (MPCR = 0.6). Following the logic of the Public Good game, the individual points contributed to the long-term pool by each participant in the group are added together, then multiplied by

1.2 and distributed to all group members, regardless of how much each one has contributed. The same happens with the contributions to the short-term pool but the multiplication factor is different: 1.8. The game also has a total contribution threshold, that simulates the risk of the irreversible consequences of climate change. Therefore, if the sum of the total contributions of a group (regardless the pool) does not reach a predefined threshold of T = 45, the game ends with a given probability of p = 0.8 and the participants that are playing the game lose their earnings and initial endowments. Moreover, the following group of the next generation won't be able to play the game. With a p = 0.2 the game continues but the endowment of the following group of the next generation decreases by 5 points. The game continues if the contribution threshold is reached in a group, i. e. the next group of the following generation could play the game.

There is also a partial contribution threshold, which only considers contributions to the long-term pool and defines the initial amount with which the G2 groups start playing. If in the G1 group the number of points invested in the long-term pool equals or exceeds the partial contribution threshold of 45 points, the initial endowment increases by 5 points for each member of the successor group (G2). If in the G1 group the number of points invested in the long-term pool is below the contribution threshold of 45 points, the initial endowment of each member of the successor group (G2) is reduced by 5 points.

Other measures

The participants completed the 16-item version of the Schwartz's value scale (1992) (De Groot & Steg 2007, 2008; Steg, Perlaviciute, Van der Werff, & Lurvink, 2014; adapted to the local context by Jakovcevic & Steg, 2013); the 14-item version of Consideration of Future Consequences Scale (CFC; Joreiman et al. 2012; adapted to the local context by Acuña et al. 2020); Van der Linden's (2015) 8-item Climate Change Perception Risk Scale, adapted to the local context by [Author, 2018]; the single-item Ideological-Political Self-Positioning Scale (Rodríguez, Sabucedo & Costa, 1993; previously assessed in Argentina by Ungaretti & Etchehazar, 2016). In this study the reliability evidence for the values scale was α = .74 for hedonism, α = .71 for egoism, α = .54 for altruism and α = .89 for biospheric values. For the immediate subscale of CFC, it adopted values of α = .74 and for the future subscale α = .75, while for the Climate Change Perception Risk scale the α was .81 for the personal subscale and .74 for the societal subscale.

Furthermore, two items proposed by Watkins & Goodwin (2020) were used (e.g., “My current lifestyle is only possible thanks to the sacrifices made by past generations‘‘). Respondents also answered questions about age, gender, place of residence, career, whether they had children or not, whether they have participated in projects related to environmental issues or whether they have had or have input in environmental organizations. We also added debriefing questions built on the previous works of Bargh and Chartrand (2000) and [Author, 2018] (e.g., respondents had to answer if they have previous information of the study or have participated in previous similar studies).

Data collection and procedure

The study was active in November/December 2020 and from February to April 2021 using the LIONESS Lab platform (Giamattei, Yahosseini, Gächter & Molleman, 2020). The study protocol was previously pre-registered [link details omitted for double-blind reviewing] and reviewed and approved by the Ethics Committee [details omitted for double-blind reviewing].

After programming the experiment, several pilots were carried out with members of the research team. The diffusion of the study was by email, social networks of the research team and via short communications in virtual classrooms of the [details omitted for double-blind reviewing]. Those who were enrolled received a link by email to start the experiment at the same time. There was a Waiting Room (or Lobby) to wait for the arrival of the remaining participants (until 15 minutes) after accepting the consent form, reading the instructions and responding to five control questions to check the comprehension of the game. When a group of three participants were formed, each participant made simultaneous and independent contribution decisions in the game. They received feedback on whether the game continues (i.e., the following group or generation could play the game) or ends based on the group's contributions, and then, they fulfil a series of questionnaires (the instructions of the experiment are detailed in Appendix B). At the end, all participants had the option of participating in a draw. Those participants who won the draw, received a prefixed amount of money. In addition, those who won points in the game also received their winnings and what they had kept in their private accounts converted into Argentine pesos (10 points = 1.5 euros (Böhm et al., 2020) = 135 pesos in Argentina in July 2020). In total, we drew 10.000 Argentine pesos and thirteen people won prizes.

Statistical analysis

As mentioned above, only decisions made by G1 participants were included in the analyses, and the alpha level was set at .05. To analyse the main hypothesis of this study, we calculated the mean of the individual contributions to the long-term pool. The parametric test (one-way ANOVA) and its non-parametric equivalent (Kruskal-Wallis test) were used to compare the long-term pool contributions in each treatment. As the dependent variable violates the assumption of normality but not the assumption of homogeneity of variances, we decided to report the parametric and non-parametric versions of the tests. It is now well established from a number of studies that in asymmetric populations the non-parametric Kruskal-Wallis test performs better than the parametric equivalent, and it is usually recommended to use the non-parametric option when both are not met (e.g. Hecke 2012; Lantz 2013). However, the study by Blanca Mena et al. (2017) showed that one-way ANOVA is quite robust to violations of the normal distribution assumption. We also compared the proportion of individuals contributing at least 15 tokens (intergenerational optimum) in the long term in T0-T1, in T0-T2 and in T0-T3 using Fisher's exact test. In addition, we examined the individuals retained in each treatment and performed correlation analysis (parametric and non-parametric tests) to explore the relationships between the variables measured by the questionnaires and the contributions to the long-term pool in the experimental climate game.

Results

As shown in Table 1, the participants of T0 had an average of contributions to the long-term pool of 9.98 (SD = 4.96) and the average of the contributions to the long-term pool in each experimental treatment was almost similar to the control (T1: M = 10.18, SD = 4.97; T2: M = 9.83, SD = 5.69; T3: M = 10.11; SD = 5.19). Contrary to was expected, the one way ANOVA for unrelated samples was not statistically significant (F(3,180) = .040, p = .989, n2p = .009), also indicated by the non-parametric analysis H(3) = .621, p = .894. These findings suggest that there was no increase in the long-term contributions for being exposed to T1, T2 or T3. Furthermore, we explored the individuals keeps, i.e., the amount that each participant decided not to contribute to neither of the pools, and no statically differences were found between the treatments for the parametric (F(3, 180) = .701, p = .553, n2p = .011) and non-parametric analyses (H(3) = 1.834, p = .607).

Table 1.

Descriptive statistics for the variable long-term individual contributions by treatment

	T0	T1	T2	T3
M	9.98	10.18	9.83	10.11
SD	4.96	4.97	5.69	5.19
Min.	0	0	0	2

Max.	20	20	30	30

Note: M and SD represent the mean and standard deviation, respectively.

The share of participants that contributed at least 15 points to the long-term pool in T1 than in T0 increases but is not statistically significant (35.5% vs 20.8%; FE test; p = 0.088). The results of T2 are in the same line with the previous (26.1% vs 20.8%; FE test; p = 0.360) and the percentage who contributed at least 15 points to the long-term pool in T3 is the same percentage of T0 (20% vs 20.8%; FE test; p = 0.563). Although the percentage of individuals that contributed at least 15 points to the long-term pool increased 14.7% in T1 and 5.3% in T2 with respect to the control, no significant differences were identified.

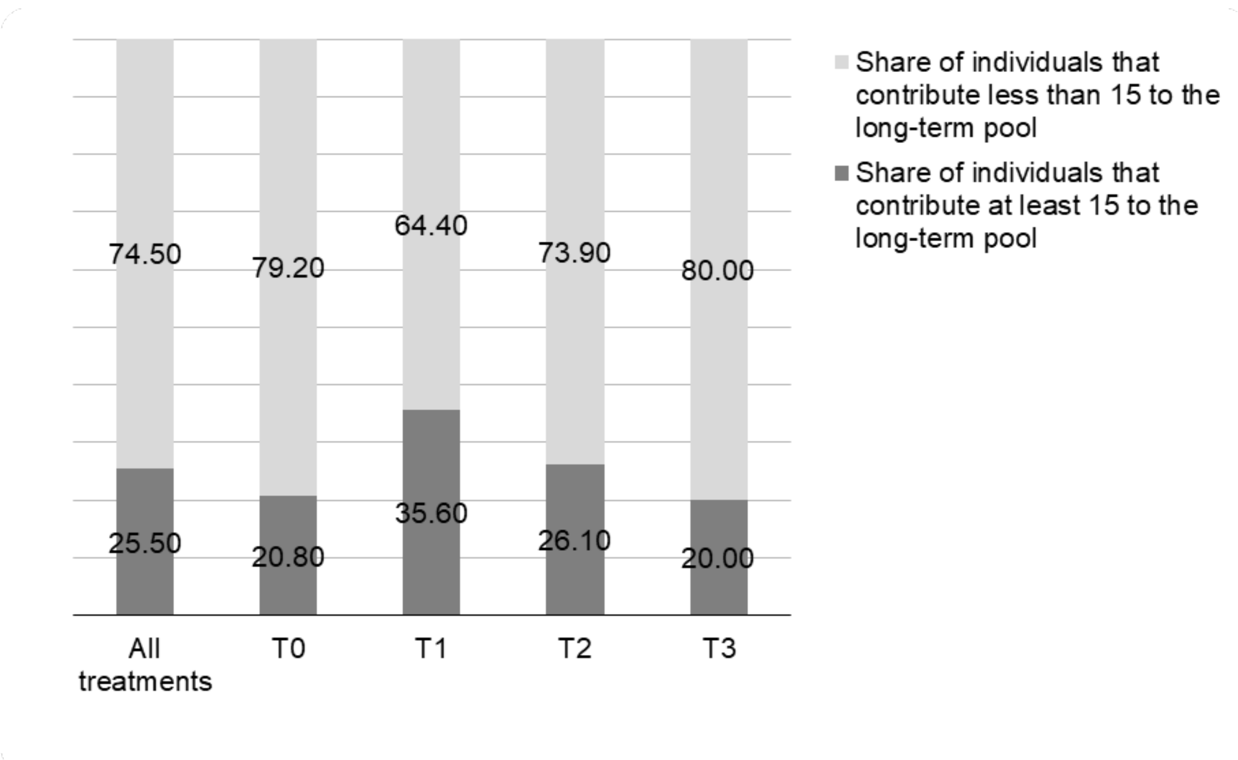

Figure 1. Percentage of participants' contributions to the long-term pool by treatment.

Regarding the dispositional variables, a statistically significant, small and inversely proportional linear association was found between participants' perception of climate change risk and short-term contributions (-.146, $p < .05$), i.e. the higher the perception of (personal) risk, the lower the contributions to the short-term pool. However, it is important to note that when the analysis was performed with its non-parametric equivalent, this correlation was not statistically significant (-.104, $p = .159$). Also, a statistically significant linear association was found between climate change risk perception and participants' long-term contributions. The higher the (societal) risk perception, the higher the contributions to the long-term pool for both parametric (.145, $p < .05$) and non-parametric statistics (.210, $p < .05$). On the other hand, ideological self-positioning was positively and statistically significantly associated with long-term contributions. People with ideological self-positioning closer to the left contributed more to the long-term pool (.200, $p < .01$). This result was similar when the non-parametric equivalent was calculated (.190, $p < .01$).

Discussion

The present study evaluates intergenerational decisions in an experimental climate game in a sample of university students. Based on previous research, we expect not only more long-term contributions in the experimental treatments than in the control, but also a greater long-term contribution in T3 than in T2 and T1, and in T2 than in T1. However, the results did not provide evidence to support this. Potential explanations are presented below.

A possible explanation could lie in the treatments themselves. The heterogeneity of responses in T2 and T3 to represent future generations also makes us wonder whether this variability weakened their potential effect on behaviour. On the one hand, in a qualitative analysis, the similarities in T2 were grouped at least in 12 thematic categories (e.g., Personality traits: “people of both generations are curious, brave, etc.”). Furthermore, participants had to write between 3 and 5 categories, so the same participant usually wrote characteristics belonging to different thematic categories. On the other hand, the responses to the imagined meeting between generations (T3) also showed variability. In this case, the topic of the conversation (e.g. curiosity about the future) and the style of discussion (e.g. surface-level, in-depth, etc.) predominated over the time or place of the conversation. The participants were requested to indicate the time and location of the interaction. However, this proved to be a challenging task for them.

According to previous studies, the amount of detail provided to participants about the context of the imagined interaction significantly moderates its effectiveness (Husnu & Crisp, 2010; Miles & Crisp, 2014). Although previous studies have applied intergroup relations theory to promote sustainable behavior, such as using the similarity task (Meleady & Crisp, 2017), and others have emphasized the importance of using indirect forms of contact (Swim & Bloodhart, 2018), this area of study remains underexplored and requires further attention. Additionally, we recommend incorporating qualitative analysis to complement experimental approaches as we did here.

One criticism that could be raised in the light of the results is whether the proposed interventions are really sufficient to position future generations in the decision scenario. From a broader perspective and considering mechanisms previously used to foster cooperation in intra-generational settings, social punishment could play a relevant role (Van Dijk & De Dreu, 2021; Van Lange et al., 2013). For example, institutions such as the Committee for the Future in Finland or the Commissioner for Future Generations in Hungary (Jones et al., 2018), established in recent years, could serve as a basis for experiments in which their members take on a punitive role. This would make it possible to assess their effectiveness in promoting decisions that consider the interests of future generations. Therefore, understanding how these classical mechanisms can be adapted to intergenerational contexts may offer valuable strategies for promoting cooperation across generations.

Another possible explanation is that certain methodological aspects of the game may be related to the results of this study. The number of members of a group that represents a generation usually varies between three (Böhm et al., 2020; Fischer, Irlenbusch, & Sadrieh, 2004; Hauser et al., 2014; Kamijo et al., 2017; Rajendra et al., 2019; Shahrier et al., 2017; Sherstyuk, Tarui, Ravago & Saijo, 2016), five (Chaudhuri et al., 2006; Grolleau, Sutan & Vranceanu, 2016) and six participants (Hurlstone et al., 2020; Jacquet et al., 2013). It would be beneficial to consider further the optimal method of representing a generation and the impact of group size on cooperation. According to a review on cooperation conducted by Van Lange and Rand (2022), dyads appear to be more cooperative than larger groups. For instance, Nosenzo, Quercia & Sefton (2015) have demonstrated that as group size increases, individuals tend to become less cooperative. However, this trend appears to plateau rapidly beyond a group size of five members.

Furthermore, we start our analysis from an abstract notion of future generations, namely, individuals who have not yet been born and about whom we possess no information. When considering future generations, such as children, one's own offspring may have had different effects on behaviour. In this context, van Treek, Majer, Zhang, Zhang & Trötschel (2023) highlight the necessity to examine the impact of varying definitions of future generations on intergenerational cooperation.

Additionally, it should be noted that previous work has suggested that conceptions of time and relationships between cultures may influence the perception of intergenerational consequences (Hernandez, Chen & Wade-Benzoni, 2006; Wade-Benzoni, 2008). Further studies in Argentina that take these variables into account are therefore needed.

Lastly, this study is not exempt from limitations. Regarding the sample, we selected a sample of students aged 18-29. The primary rationale for utilising this sample is that this research represents a preliminary investigation into the experimental study of intergenerational cooperation within our context. In order to minimise variability and ensure internal validity, employing this specific sample was an appropriate decision. Furthermore, previous intergenerational experimental studies have used samples of university students (e.g. Jacquet et al., 2013; Hurlstone et al., 2020, etc.). However, university students are a subgroup of the general population with specific characteristics, and research has shown that they behave more selfishly in experimental games than other samples that do not include students (Belot, Duch & Miller, 2015). In addition, future research should aim to include a more balanced sample with respect to gender and whether participants have children.

Regarding data collection, it took place during the Coronavirus outbreak — a period marked by significant uncertainty when it came to thinking about and engaging with the future (Lalot et al., 2021). However, some narratives stressed the need for a sustainable recovery from the pandemic that would safeguard the well-being of future generations (Belesova, Heymann & Haines, 2020; Giovannini et al., 2020).

Due to financial constraints, it was not possible to pay each participant. This is likely to encourage participants from leaving the study (e.g., by waiting in the lobby until another participant arrives). The following types of payment situations in related studies were identified: experimental units earned in the game are converted into real money (e.g., Grolleau et al., 2016), an initial endowment of pre-fixed money (e.g., Böhm et al., 2020), while other studies use real money and participants receive it at different times as part of the treatment (e.g., Jacquet et al., 2013). Chaudhuri et al. (2006) proposed a "partial inter-generational caring". This model entails that each participant earns more than 50% of his or her successor's winnings in the subsequent generation. It would be of interest to conduct studies comparing this form of payment with intergenerational decisions. Moreover, as is the case with other online studies, dropouts represent a significant challenge in online interactive experiments. Network problems, distractions, and impatience to wait in the lobby are difficult to control (Arechar, Gächter & Molleman, 2017).

As mentioned earlier, we have tried to control various aspects that improve the internal validity of the experiment (e.g. reducing the variability of the sample), but we have not taken into account aspects that make up the external and/or ecological validity. To illustrate, sustainable decisions were understood here as contributions to the long-term pool. However, we could also offer the possibility of sustainable consumption decisions, such as purchasing items that reduce energy and/or water consumption in the household, changing dietary habits, highlighting short and long-term effects, among others. Previous studies that have experimentally investigated human cooperation have included, for example, the option of donating what they have earned in the game (Benz & Meier, 2008; Author, 2019).

Conclusion

The present study examined intergenerational sustainability dilemmas among university students, contributing to the development of research on future generations while emphasizing the methodological challenges involved in their measurement. Among the main findings, the study highlights the difficulty of the proposed interventions in fostering intergenerational cooperation, as well as the relevance of dispositional variables such as perceptions of climate change and ideological self-positioning. Future research is encouraged to explore samples beyond the university setting and to incorporate additional interventions to promote intergenerational cooperation (e.g., leveraging classic mechanisms from game theory, such as punishment).

Acknowledgments

[details omitted for double-blind reviewing]

References

Acuña, I., Zalazar-Jaime, M. F., Michelini, Y., Guzmán, J. I., Godoy, J. C., Galarce, E., & Joireman, J. (2020). Argentine validation of the Consideration of Future Consequences Scale (CFC-14). Acta Colombiana de Psicología, 23(1), 346-356. doi: 10.14718/acp.2020.23.1.16

Allport, G. W. (1954). The nature of prejudice. Cambridge, MA: Addison-Wesley

Arechar, A. A., Gächter, S., & Molleman, L. (2018). Conducting interactive experiments online. Experimental economics, 21, 99-131.doi: 10.1007/s10683-017-9527-2

Author (2019)

Bargh, J. A., & Chartrand, T. L. (2000). Studying the mind in the middle: A practical guide to priming and automaticity research. Handbook of research methods in social psychology, 253-285.

Author (2018)

Belesova, K., Heymann, D. L., & Haines, A. (2020). Integrating climate action for health into Covid-19 recovery plans. Bmj, 370. doi: 10.1136/bmj.m3169

Belot, M., Duch, R., & Miller, L. (2015). A comprehensive comparison of students and non-students in classic experimental games. Journal of Economic Behavior & Organization, 113, 26-33. doi: 10.1016/j.jebo.2015.02.007

Benz, M., & Meier, S. (2008). Do people behave in experiments as in the field? —evidence from donations. Experimental economics, 11, 268-281. doi: 10.1007/s10683-007-9192-y

Blanca Mena, M. J., Alarcón Postigo, R., Arnau Gras, J., Bono Cabré, R., & Bendayan, R. (2017). Non-normal data: Is ANOVA still a valid option? Psicothema, 29(4), 52-557. doi: 10.7334/psicothema2016.383

Böhm, R., Gürerk, Ö., & Lauer, T. (2020). Nudging climate change mitigation: a laboratory experiment with inter-generational public goods. Games, 11(4), 1-20. doi: 10.3390/g11040042

Chaudhuri, A., Graziano, S., & Maitra, P. (2006). Social learning and norms in a public goods experiment with inter-generational advice. The Review of Economic Studies, 73(2), 357-380. https://doi.org/10.1111/j.1467-937X.2006.0379.x

Chen, Y., Wu, J., & Luan, S. (2023). The mechanisms and promotion strategies of cooperation in the intergenerational dilemma. Advances in Psychological Science, 31(9), 1728-1741. https://journal.psych.ac.cn/xlkxjz/EN/10.3724/SP.J.1042.2023.01728

De Groot, J. I., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. Environment and Behavior, 40(3), 330-354. doi: 10.1177/0013916506297831

De Groot, J., & Steg, L. (2007). General beliefs and the theory of planned behavior: The role of environmental concerns in the TPB. Journal of Applied Social Psychology, 37(8), 1817-1836. doi: 10.1111/j.1559-1816.2007.00239.x

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior research methods, 39(2), 175-191. doi: 10.3758/BF03193146

Fischer, M. E., Irlenbusch, B., & Sadrieh, A. (2004). An intergenerational common pool resource experiment. Journal of environmental economics and management, 48(2), 811-836. doi: 10.1016/j.jeem.2003.12.002

Giamattei, M., Yahosseini, K. S., Gächter, S., & Molleman, L. (2020). LIONESS Lab: A free web-based platform for conducting interactive experiments online. Journal of the Economic Science Association, 6(1), 95-111. doi: 10.1007/s40881-020-00087-0

Giovannini, E., Benczur, P., Campolongo, F., Cariboni, J., & Manca, A. R. (2020). Time for transformative resilience: the COVID-19 emergency (No. JRC120489). Joint Research Centre (Seville site).https://ideas.repec.org/p/ipt/iptwpa/jrc120489.html

Grolleau, G., Sutan, A., & Vranceanu, R. (2016). Do people contribute more to intra-temporal or inter-temporal public goods? Research in Economics, 70(1), 186-195. doi: 10.1016/j.rie.2015.05.001

Hauser, O. P., Rand, D. G., Peysakhovich, A., & Nowak, M. A. (2014). Cooperating with the future. Nature, 511(7508), 220-223. doi: 10.1038/nature13530

Hecke, T. V. (2012). Power study of anova versus Kruskal-Wallis test. Journal of Statistics and Management Systems, 15(2-3), 241-247. doi: 10.1080/09720510.2012.10701623

Hernandez, M., Chen, Y. R., & Wade-Benzoni, K. A. (2006). Toward an understanding of psychological distance reduction between generations: A cross-cultural perspective. In National culture and groups (Vol. 9, pp. 3-20). Emerald Group Publishing Limited.

Hurlstone, M. J., Price, A., Wang, S., Leviston, Z., & Walker, I. (2020). Activating the legacy motive mitigates intergenerational discounting in the climate game. Global Environmental Change, 60, 102008. doi: 10.1016/j.gloenvcha.2019.102008

Husnu, S., & Crisp, R. J. (2010). Elaboration enhances the imagined contact effect. Journal of Experimental Social Psychology, 46(6), 943-950. doi: 10.1016/j.jesp.2010.05.014

Inoue, Y., Himichi, T., Mifune, N., & Saijo, T. (2021). People prefer joint outcome prosocial resource distribution towards future others. Scientific Reports, 11(1), 5373. doi: 10.1038/s41598-021-84796-4

IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, 184 pp., doi: 10.59327/IPCC/AR6-9789291691647.

Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A., & Hertwich, E. G. (2016). Environmental impact assessment of household consumption. Journal of Industrial Ecology, 20(3), 526-536. doi: 10.1111/jiec.12371

Jacquet, J., Hagel, K., Hauert, C., Marotzke, J., Röhl, T., & Milinski, M. (2013). Intra-and intergenerational discounting in the climate game. Nature climate change, 3(12), 1025-1028. doi: 10.1038/NCLIMATE2024

Jakovcevic, A., & Steg, L. (2013). Sustainable transportation in Argentina: Values, beliefs, norms and car use reduction. Transportation Research Part F: Traffic Psychology and Behaviour, 20, 70-79. doi: 10.1016/j.trf.2013.05.005

Jones, N., O'Brien, M., & Ryan, T. (2018). Representation of future generations in United Kingdom policymaking. Futures, 102, 153-163. doi: 0.1016/j.futures.2018.01.007

Kamijo, Y., Komiya, A., Mifune, N., & Saijo, T. (2017). Negotiating with the future: Incorporating imaginary future generations into negotiations. Sustainability Science, 12(3), 409-420. doi: 10.1007/s11625-016-0419-8

Lalot, F., Abrams, D., Ahvenharju, S., & Minkkinen, M. (2021). Being future-conscious during a global crisis: The protective effect of heightened Futures Consciousness in the COVID-19 pandemic. Personality and Individual Differences, 178, 110862. doi: 10.1016/j.paid.2021.110862

Lantz, B. (2013). The impact of sample non-normality on ANOVA and alternative methods. British Journal of Mathematical and Statistical Psychology, 66(2), 224-244. doi: 10.1111/j.2044-8317.2012.02047.x

Lohse, J., & Waichman, I. (2020). The effects of contemporaneous peer punishment on cooperation with the future. Nature communications, 11(1), 1-8. doi: 10.1038/s41467-020-15661-7

Meleady, R., & Crisp, R. J. (2017). Redefining climate change inaction as temporal intergroup bias: Temporally adapted interventions for reducing prejudice may help elicit environmental protection. Journal of Environmental Psychology, 53, 206-212. doi: 10.1016/j.jenvp.2017.08.005

Meleady, R., & Seger, C. R. (2017). Imagined contact encourages prosocial behaviour towards outgroup members. Group Processes & Intergroup Relations, 20(4), 447-464. doi: 10.1177/1368430215612225

Meleady, R., & Seger, C. R. (2017). Imagined contact encourages prosocial behavior towards outgroup members. Group Processes & Intergroup Relations, 20(4), 447-464. doi: 10.1177/13684302156122

Miles, E., & Crisp, R. J. (2014). A meta-analytic test of the imagined contact hypothesis. Group Processes & Intergroup Relations, 17(1), 3-26. doi: 10.1177/1368430213510573

Nosenzo, D., Quercia, S. & Sefton, M. (2015). Cooperation in small groups: the effect of group size. Experimental Economics, 18, 4–14. doi: 10.1007/s10683-013-9382-8

Author (2019)

Author (2024)

Pearson, A. R., & Schuldt, J. P. (2018). Climate change and intergroup relations: Psychological insights, synergies, and future prospects. Group Processes & Intergroup Relations, 21(3), 373-388. https://doi.org/10.1177/1368430217747750

Peters, J. (2017). Heterogeneity and Voting in Intergenerational Common Pool Problems. Master Degree Thesis in Business Administration. Faculteit der Managementwetenschappen

Rodríguez M., Sabucedo J., Costa M. (1993). Factores motivacionales y psicosociales asociados a los distintos tipos de acción política. Psicología Política, 7, 19-38. https://dialnet.unirioja.es/servlet/articulo?codigo=2826349

Shahen, M. E., Masaya, W., Kotani, K., & Saijo, T. (2020). Motivational factors in intergenerational sustainability dilemma: A post-interview analysis. Sustainability, 12(17), 7078. doi: 10.3390/su12177078

Shahrier, S., Kotani, K., & Saijo, T. (2017). Intergenerational sustainability dilemma and the degree of capitalism in societies: a field experiment. Sustainability science, 12(6), 957-967. doi: 10.1007/s11625-017-0447-z

Sherstyuk, K., Tarui, N., Ravago, M. L. V., & Saijo, T. (2016). Intergenerational games with dynamic externalities and climate change experiments. Journal of the Association of Environmental and Resource Economists, 3(2), 247-281.

Steg, L., Perlaviciute, G., Van der Werff, E., & Lurvink, J. (2014). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. Environment and behavior, 46(2), 163-192. doi: 10.1177/0013916512454730

Swim, J. K., & Bloodhart, B. (2018). The intergroup foundations of climate change justice. Group Processes & Intergroup Relations, 21(3), 472-496. doi: 10.1177/1368430217745366

Tajfel, H. & Turner, J. C. (1986). The social identity theory of intergroup behaviour. In S.Worchel & W. Austin (Eds.), Psychology of intergroup relations (pp. 7–24). Chicago, IL: Nelson Hall.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S.D. & Wetherell, M. S. (1987). Rediscovering the social group: A self-categorization theory. Oxford, UK: Blackwell

Ungaretti, J., & Etchezahar, E. (2016). Visiones del mundo, autoritarismo y dominancia en diferentes expresiones de prejuicio. Acta de investigación psicológica, 6(3), 2500-2508. doi: 10.1016/j.aipprr.2016.11.004

Van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. Journal of Environmental Psychology, 41, 112-124. doi: 10.1016/j.aipprr.2016.11.004

Van Dijk, E., & De Dreu, C. K. (2021). Experimental games and social decision making. Annual Review of Psychology, 72(1), 415-438 doi: 10.1146/annurev-psych-081420-110718

Van Lange, P. A., & Rand, D. G. (2022). Human cooperation and the crises of climate change, COVID-19, and misinformation. Annual Review of Psychology, 73, 379-402. doi: 10.1146/annurev-psych-020821-110044

Van Lange, P. A., Joireman, J., Parks, C. D., & Van Dijk, E. (2013). The psychology of social dilemmas: A review. Organizational Behavior and Human Decision Processes, 120(2), 125-141. doi: 10.1016/j.obhdp.2012.11.003

van Treek, M., Majer, J. M., Zhang, H., Zhang, K., & Trötschel, R. (2023). Present generation's negotiators realize their interests at the cost of future generations. Journal of Environmental Psychology, 91, 102126. doi: 10.1016/j.jenvp.2023.102126

Wade-Benzoni, K. A. (2008). Maple trees and weeping willows: The role of time, uncertainty, and affinity in intergenerational decisions. Negotiation and Conflict Management Research, 1(3), 220-245. doi: 10.1111/j.1750-4716.2008.00014.x

Wade-Benzoni, K. A., & Tost, L. P. (2009). The egoism and altruism of intergenerational behavior. Personality and Social Psychology Review, 13(3), 165-193. doi: 10.1177/1088868309339317

Watkins, H. M., & Goodwin, G. P. (2020). Reflecting on sacrifices made by past generations increases a sense of obligation towards future generations. Personality and Social Psychology Bulletin, 46(7), 995-1012. doi: 10.1177/014616721988361