

## Article

# Characteristics That Influence Individuals' Intentions to Use and Bequeath Common Assets: Time-Perspective Scales and Demographic Attributes

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**Abstract:** As global environmental problems worsen, there is a concern for future generations who may face an unfairly degraded environment. In this study, we asked individuals from the current generation questions about using and bequeathing a common local asset to future generations in order to identify individual characteristics that influence their intentions to benefit future generations. A total of 960 Japanese individuals ranging from 20 to over 70 years old participated in an online survey. Explanatories include five time-perspective scales based on the psychology literature and demographic attributes such as age, sex, household income, marital status, final education level, and population size. Using logistic regression, we found that altruism was the most significant and positive factor influencing their intentions to benefit future generations. Three other time-perspective scales, namely future neglect, creativity, and generativity, also influenced the intentions, albeit negatively and to a lesser extent. Demographic attributes were generally not found to significantly influence intentions. Finally, we argue that three psychological conditions—time horizon, negative aspects of creativity, and sufficient altruism—could potentially lead people to choose decisions that are more beneficial to future generations.

**Keywords:** future generations; intergenerational justice; resource allocation; behavioral intention; psychological conditions; altruism



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## 1. Introduction

What kind of persons tend to care for our future generations? Exacerbated global environmental problems are currently having widespread adverse impacts [1–3] and threatening the well-being of future generations. This has motivated research about intergenerational issues in both empirical and normative directions. For example, such research has included empirical studies about the profiles of greenhouse gas emissions by different generations and age groups [4], the young generation's climate anxiety [5] and pro-environmental behaviors (PEBs) [6], and intergenerational transmission of PEBs [7], as well as normative arguments on intergenerational justice [8] and climate justice [9–11]. Also, there are recent discussions on institutions that aim to rectify our short-sightedness and internalization of future generations. For example, González-Ricoy and Gosseries [12] investigated how to mitigate short-termism, i.e., the priority given to present net benefits at the cost of future benefits. Short-termism is not necessarily confined to, and thus broader than, the neglect of future generations, so it can be applied to a less distant future within a generation. MacKenzie [13] described four types of short-termism (voters, politicians, interest groups, and absence of future generations) and showed that short-termism is embedded in our political system, and finally explained how different ideas of proposed institutions may change to become more future-oriented. In his follow-up study, MacKenzie [14] further discussed the design of these future-oriented institutions and indicated the importance of inclusive deliberative processes.

If the present generation is actually too short-sighted to consider the consequences of their current actions on future generations, then we might have to ask what motivates such behaviors and how to rectify them. The present study thus aims to identify the characteristics of individuals that may be associated with behaviors that are more beneficial to future generations.

In what follows, we briefly look at two relevant strands of the literature to orientate our research. The first group of studies, much related to this discussion on institutional reform, emphasizes putting theory into practice by explicitly considering future generations in experiments and deliberations. For example, Saijo and other authors introduced the concept of “Future Design” and developed a method that incorporates the welfare of future generations in social decisions by including an imaginary future generation in the deliberation process [15–18]. Nakagawa [19] conducted an in-depth transcriptional analysis of a series of Future Design workshops and demonstrated four factors influencing the perspectives of the workshop participants: (a) discounting the present generation’s costs, (b) contrasting the future with the present, (c) deconstructing the hierarchy (i.e., disengaging from current norms and structure in which people are embedded), and (d) intellectual joy. In another study on the effect of public workshops on city hall renovation, Nishimura et al. [20] contrasted an ordinary workshop and a Future Design workshop. They found that the Future Design workshop mitigated the pro-self attributes of participants (i.e., egoistic or seeking to increase gains of the current generation, thereby tending not to allocate gains to future generations) and prevented them from becoming more myopic regarding their demands.

Generally, of the various factors influencing participants in such workshops, it is not easy to identify those that significantly influence the participants’ final decisions with regard to the benefit to future generations. To complement deliberative research, several researchers have attempted to develop simple experimental designs that showed a situation/context in which people tended to choose a decision beneficial for future generations. Kamijo et al. [21] devised and used an intergenerational sustainability dilemma game (ISDG) in which participants in groups chose one of two options with different gains: a sustainable option that allows the next generation to have the same option (that is, the next generation can gain the same amount as the current generation) and an unsustainable option, in which the current generation gains more and the future generation gains less. In their experiment involving university and graduate students, the sustainable option was chosen by 28% of the participants in the control group and 60% of the participants in the experimental group, which included the voices of imaginary future generations. Shahan et al. [22] applied the ISDG to individuals (they referred to this as “one-person ISDG”) and concluded that pro-social participants tended to choose the sustainable option. However, the types of people who tend to think more about the future have not been sufficiently investigated. For example, Kamijo et al. [21] recruited 210 graduate and undergraduate students, whereas Shahan et al. [22] recruited 104 university students. Hence, participants in laboratory experiments tend to be limited in number and diversity, with some studies claiming that university students, who are often used in laboratory experiments, do not adequately represent the preferences of society as a whole (e.g., Belot et al. [23] and Cappelen et al. [24]). Future studies on the ISDG are expected to increase the number and diversity of participants.

In a similar vein, Hauser et al. [25] introduced another example of a simple experimental design. They devised a similar experimental game called the intergenerational goods game, in which the voting of group members determines each group’s decision on how much a certain common resource should be used. Interestingly, their experiment showed that the common resource was almost always destroyed when decisions were made individually but not when the decision was made by voting. The subjects in their study, which were gathered by using the crowdsourcing marketplace Amazon Mechanical Turk, were not limited to university students and included U. S. residents, but the authors did not investigate which types of persons tend to take future generations into consideration.

Thus, the following questions still remain unanswered in a large population: Does income level affect the way people view the importance of future generations? How do marital status and presence of children affect decision-making? Does a difference in people's perspectives of the future affect how they consider future generations?

The second group of studies in the field of personality psychology has looked at how people perceive time—the past, present, and future—and what attitudes they formulate towards time. Such perspective is known as “time perspective” and is considered to influence current behavior. Time perspective was defined by Lewin [26] as “the totality of the individual's views of his psychological future and psychological past existing at a given time”. According to Nuttin [27], the concept of time perspective was ambiguous and could not be operationalized for quantitative studies. Nuttin [27], therefore, classified different types of time perspectives, and several scholars in the 1980s and 1990s, such as Daltrey and Langer [28], McAdams and de St. Aubin [29], Strathman et al. [30], Shirai [31,32], and Zimbardo and Boyd [33], attempted to construct scales and subscales that measure people's time perspectives, especially in the case of adolescents.

The constructed subscales, for example, include future neglect, which is associated with short-termism discussed by the previous studies in the field of politics [12–14] and presumably influences the behaviors of the current generation. Nevertheless, it remains unclear how these constructed scales and subscales can be utilized to identify tendencies in various people's decision-making processes regarding intergenerational issues.

Against this background and challenges of the literature, we thus aim to identify characteristics of individuals that tend to consider future generations in a setting that involves a more diverse general public than experiments or workshops. In particular, we engage members of the general public, ranging from the young to the elderly, and investigate how the time-perspective scales, which are the insights from the above-mentioned psychology literature, and the demographic attributes of the participants influenced their intentions to use or overuse a common asset that is passed on to the next generation.

## 2. Materials and Methods

### 2.1. Survey Design

In our online survey, we employed the ISDG methodology devised by Kamijo et al. [21]. Each respondent was asked to choose between two options for the use of a common local asset. In Option A, a common local asset yielded a benefit of 360,000 yen, but the asset would deteriorate by  $X$  yen; therefore, the next generation would be able to benefit from the common asset by  $[360,000 - X]$  yen. In the other option, the common asset yielded a benefit of 270,000 yen, with no deterioration to the asset, which could be bequeathed to the next generation. Because the latter option results in a more sustainable use of the common asset, we refer to this option as “Option S” in this article so that readers can distinguish the two options easily.

To investigate the stability of the influence of time-perspective scales and demographic attributes in different intergenerational contexts, we set four cases for decision-making (Table 1). In Case I, the deterioration in asset value ( $X$ ) is 90,000 (control case). In Cases II and IV, a treatment that the respondents knew that the previous generation had chosen Option A and damaged the asset was introduced. The explanation shown to respondents was “Your parents' generation chose Option A and damaged the common asset.” In Cases III and IV, Option A would cause severe damage to the asset ( $X = 360,000$ ), and the next generation could no longer benefit from it (the second treatment). The explanation shown to respondents was “the gain that the next generation (your children's generation) can receive from the common asset will be reduced by 360,000 yen. That is, the next generation can no longer use the common asset.” (See Supplementary Materials S1 for the exact explanation and questions used). Each respondent answered one of the four cases.

**Table 1.** Four cases investigated in this study.

		Previous Generation's Choice Damaged the Common Local Asset	
		Not Informed	Informed
Level of damage to common local asset in Option A	X = 90,000	Case I (Control)	Case II
	X = 360,000 (next generation cannot use)	Case III	Case IV

Kamijo et al. [21] divided their participants into groups to examine the effect of group discussion on the group's choice; conversely, our study addressed only the choices of individuals, such as in the one-person ISDG conducted by Shahan et al. [22], and there was no discussion with other participants. With this setting, the relationship between the respondents' choices and their attributes and perspectives was elucidated. The second difference is that our study surveyed people in diverse age groups from 20 to over 70 years old without a limitation to university students. The third difference is that our study focused on internal factors and attributes influencing behavioral intentions, such as personal attitudes, subjective norms, and age. Aizen's theory of planned behavior [34] distinguishes between behavioral intention and actual behavior, and we believe that for a deeper understanding of human behavior, multiple studies should be conducted for each. In this study, we focused on behavioral intention and did not offer real rewards, which are external factors targeted in studies on actual behavior. We also presumed that if the experiment was monetarily incentivized, it would be more difficult to identify the influence of the characteristics of the individual respondents.

## 2.2. Online Survey

In March 2021, an online questionnaire in the Japanese language was sent to Japanese respondents who were selected from the access panel of a survey company (Intage Inc., Tokyo, Japan). The respondents were randomly and equally divided into four groups and assigned to answer their choices in one of the four cases. Quota sampling was applied to every group with 12 equal quotas covering both sexes and six age groups of people in their 20s, 30s, 40s, 50s, 60s, and over 70. In total, 960 responses were collected, with 240 responses for each of the four cases.

## 2.3. Regression Analysis to Identify Influential Factors

The respondents chose either unsustainable Option A or sustainable Option S in a case. A logistic function is often used for regression analysis that identifies factors related to binary dependent variables. In this method, we adopted Option A as 0 and Option S as 1 for the dependent variables and subsequently performed a logistic regression with the five time-perspective scales and demographic attributes mentioned in Sections 2.4 and 2.5, as well as with their interaction terms. In addition, we analyzed the results by parameterizing the two treatments of the four cases into two dummy variables. Four regression models were eventually used after several attempts. In Model 1, the five time-perspective scales and two dummy variables for the cases were used as explanatory variables. In Model 2, the demographic attributes were added to the explanatory variables of Model 1 in order to find the influence of demographic attributes. As seen later, the estimation of the regression coefficients of the time-perspective scales is important. In Model 3, interaction terms between the five time-perspective scales and demographic attributes were added to the explanatory variables of Model 2 to see whether or not the regression coefficients of the time-perspective scales in Model 2 were changed by other explanatory variables. Interaction terms were included when the addition decreased the Akaike Information Criterion (AIC) of the regression model, and the result showed statistical significance. In Model 4, the time-perspective scale and demographic attributes that were not statistically significant in Model 3 (i.e., not  $p < 0.05$ ) were excluded from the explanatory variables, and

interaction terms between the two dummy variables of the cases and the time-perspective scales or the demographic variables were added if the addition decreased the AIC and the result showed statistical significance. R version 4.0.3 was used, and the obtained regression coefficients and average marginal effects of each explanatory variable were discussed. (The “margins” package [35] was used to calculate marginal effects.) The variance inflation factors (VIFs) of the explanatory variables were two or less, and the VIFs in cases that involved interaction terms were less than ten, so there was no concern about multicollinearity between explanatory variables.

#### 2.4. Demographic Attributes

For independent variables, we used the following demographic attributes: age group (young (20s and 30s), middle-aged (40s and 50s), and old (60s and over 70 years old)), sex (male and female), annual household income (low (less than three million yen), middle (less than six million yen), and high), marital status (married and unmarried), whether or not respondents have children living at home, final education level (high school graduate, junior college graduate, and university graduate or higher), and the population size of the place of residence (small (less than 100,000), medium (less than 300,000), and large).

A few previous studies showed that these demographic attributes had several influences on intergenerational choices, although these studies examined limited populations, such as university students. On the one hand, Nishimura et al. [20] showed that younger participants in their Future Design workshop tended to be influenced by a treatment that considered an imaginary future generation in paired discussions, whereas they were not influenced by this consideration without the treatment. Shahrier et al. [36] and Timilsina et al. [37], who studied ISDG with Bangladeshi and Nepalese participants, respectively, showed that rural people tended to choose sustainable options more frequently than urban people did. On the other hand, Koirala et al. [38] found that gender was not a significant factor in their ISDG in which university students participated. Timilsina et al. [37] found that there were no significant differences in the choice of the sustainable option by gender, education, income, and single-family status in their ISDG of 102 Nepalese. Our study is intended to confirm these influences on intention to use and overuse a common local asset that is passed on to the next generation within a larger population.

#### 2.5. Time-Perspective Scales

Demographic attributes are often used as independent variables in various regression analyses; however, as mentioned in the previous subsection, earlier ISDG studies only showed a few relationships. Therefore, we used psychometric variables as the main focus of this study. From various psychometric variables (e.g., Bearden et al. [39]), we chose to explore time-perspective scales because (a) these scales are related to attitudes towards the future, and some of them may reflect intertemporal attitudes that could affect intergenerational decisions, and moreover, (b) some scales encompass the concepts of future neglect and generativity, which are highly relevant to the decision that respondents face. Specifically, generativity is “primarily the concern in establishing and guiding the next generation”, according to Erikson [40], and the generativity (maintaining) subscale measures the effort a subject puts into sustaining an ongoing product, project, or tradition (McAdams and de St. Aubin, 1992 [29]). Jie et al. [41] found that individuals in emerging adulthood who had greater generative concern demonstrated greater environmentalism approximately a decade later.

Thus, we attempted to use the following different time-perspective scales developed in previous studies, with the first group being related to attitudes about the future and the second encompassing the concept of generativity: (1) scale of core beliefs about time (CBS) [31], experiential time-perspective scale (ETP) [31,32], consideration of future consequences (CFC) scale (developed by Strathman et al. [30], factorized by Joireman et al. [42], and translated into Japanese by Inoue and Arimitsu [43]), and the Zimbardo time-perspective inventory (ZTPI) (Zimbardo and Boyd [33]; translated into Japanese by

Shimajima et al. [44]), and (2) the generative concern scale (GCS) and generativity behavior checklist (GBC) (original by McAdams and de St. Aubin [29]; translated into Japanese and revised by Marushima [45]). These scales ask about respondents' attitudes using the words "To what extent do the following statements apply to you?" or, for the CBS, "Do you agree or disagree with the following opinions?". The GBC, however, asks about respondents' behavior in the past, using the words "How often during the previous 2 months did you perform the given act?".

The content of several subscales overlapped, however, and the total number of items (questions/statements) was too large for our study. To reduce the number of items, we focused on those with large factor loadings and easy statements that a variety of respondents would understand. Finally, we chose 44 items from the following subscales of the time-perspective scales (see Supplementary Materials S2 for the statements in English): acceptance of delayed gratification and future neglect (originally called "indifference to the future") from the CBS; goal-directedness, helpfulness, self-fulfillment, and acceptance of the past from the ETP; CFC-future and CFC-immediate from the CFC scale; past negative from the ZTPI; creativity, altruism (offering), and generativity (maintaining) from the GCS; and the GBC (which has no subscale). Altruism is presumably an important factor because previous studies of ISDG have shown that the tendency of pro-social persons to choose the sustainable option is statistically significant [21,36–38]. Pro-social means a tendency to maximize the joint profit of multiple persons rather than maximizing self-profit (individualistic) or difference with others (competitive) and thus is similar in meaning to altruistic. Although creativity may seem unrelated to time perspective, it is related to future goal-oriented action or action with a prospect beyond the present status quo, as explained by Corazza [46]. As in the original scales, items from the CBS, ETP, CFC, and ZTPI scales were rated on a 5-point Likert scale (1 = disagree/does not apply to me to 5 = agree/applies to me), those of the GCS were rated on a 4-point Likert scale (1 = does not apply to me at all to 4 = very much applies to me), and those of the GBC were rated on a 3-point scale (zero, once, and more than once).

Next, we used Cronbach's alpha to measure their internal consistency to determine what time-perspective scales will be used (IBM SPSS Statistics 23 software package was used). We then conducted confirmatory factor analysis to ensure the selection of the time-perspective scales (the package of lavaan 0.6–16 in R was used with maximum likelihood estimation). The mean of the scores given by a respondent in a selected scale or subscale was taken as the score of the respondent for that scale.

### 3. Results and Discussion

#### 3.1. Selection of Time-Perspective Scales for Further Analysis

We obtained the results of calculated internal consistency (Cronbach's alpha) of the time-perspective subscales, as shown in Table 2. Among them, ETP, future neglect, creativity, altruism, and generativity had relatively large values exceeding approximately 0.7. The results of confirmatory factor analysis of these five scales indicated 0.069 of Root Mean Square Error of Approximation (RMSEA) and 0.076 of Standardized Root Mean Square Residual (SRMR) regarding the goodness of fit; both are less than 0.08 [47,48]. In addition, the standardized estimates of all the factor loadings were more than 0.36 ( $p = 0.000$  for every factor loading). We, therefore, used these scales for further analysis (we interpreted ETP as measuring a positive attitude to the passage of time, subsequently referred to as "positive time passage"). Table 3 presents the descriptive statistics of the five surveyed time-perspective scales.

**Table 2.** Internal consistency of time-perspective scales surveyed (Cronbach's alpha).

Scale	Subscale	No. of Items	Cronbach's $\alpha$
<b>ETP</b>		<b>12</b>	<b>0.815</b>
CBS	Delayed gratification	2	0.498
	<b>Future neglect</b>	<b>3</b>	<b>0.692</b>
CFC	CFC-future	3	0.559
	CFC-immediate	3	0.540
ZTPI	Past negative	2	0.430
GCS	<b>Creativity</b>	<b>5</b>	<b>0.782</b>
	<b>Altruism</b>	<b>5</b>	<b>0.756</b>
	<b>Generativity</b>	<b>5</b>	<b>0.744</b>
GBC		4	0.520

Bold letters indicate the selected scales used for the regression analysis.

**Table 3.** Descriptive statistic values of five time-perspective scales ( $n = 960$ ).

	Mean	Standard Deviation	Coefficient of Variance	Range
Future neglect	2.75	0.71	26%	1–5
Positive time passage	3.02	0.55	18%	1–5
Creativity	2.29	0.53	23%	1–4
Altruism	2.59	0.47	18%	1–4
Generativity	2.19	0.52	24%	1–4

### 3.2. Results of the Four Cases

Table 4 presents the results of the four scenarios. In Case I (control), 78% of the respondents chose sustainable Option S, with the majority of participants taking future generations into consideration. Comparisons of Case I with Case III and Case II with Case IV showed that the respondents tended to choose sustainable Option S ( $p < 0.2$  and  $p < 0.05$ , respectively) when they knew that their choice would greatly affect the common asset and future generations are no longer able to benefit from it. On the other hand, the statistical significance of differences in comparisons between Cases I and II and Cases III and IV were very weak ( $p < 0.2$  and  $p = 0.408$ , respectively). These statistical differences will be discussed later in the results of the regression analysis.

**Table 4.** Results of choosing a sustainable option about using and bequeathing a common asset.

% of Respondents Who Chose Option S <sup>a</sup>	Previous Generation's Choice Damaged the Common Local Asset		
	Not Informed (C)	Informed (D)	(D) – (C)
Can (A)	Case I 78.3%	Case II 74.6%	$\Delta = -3.8\%$ #
Cannot (B)	Case III 81.7%	Case IV 80.8%	$\Delta = -0.8\%$
(B) – (A)	$\Delta = 3.3\%$ #	$\Delta = 6.3\%$ *	All cases 78.9%

\*  $p < 0.05$ , #  $p < 0.2$  (test of the difference in the proportions of two populations).  $n = 240$  for each case. <sup>a</sup> Option S (sustainable option): smaller benefit, but the common local asset is sustained. The alternative was Option A (unsustainable option): larger benefit but a deterioration in the common local asset.

### 3.3. Results of Logistic Regression and Discussion of Time-Perspective Scales

The results (regression coefficients) of the logistic regression analysis of the choice to use and bequeath a common asset are shown in Table 5. The results of four regression models are presented. Table 6 presents the average marginal effects of explanatory variables

to indicate the average magnitude of influence on the dependent variable from a change of a single unit in the explanatory variable. It should be noted that the relationships between the listed choices, five scales, and dummy variables are not necessarily causal but are at least correlated.

**Table 5.** Results of the logistic regression for factors that influence the decision about using and bequeathing a common asset: regression coefficient.

Explanatory Variables	Model 1	Model 2	Model 3	Model 4
Altruism	1.2199 ***	1.2713 ***	4.3935 ***	4.3406 ***
x Creativity			−0.7275 **	−0.6696 *
x Junior college graduate			−0.7766	−0.8213
x University graduate or higher			−2.1771 ***	−2.2503 ***
Creativity	−0.4126 *	−0.4689 *	0.7500	0.8709
x Junior college graduate			−1.2392 +	−1.2380 +
x University graduate or higher			1.1423 *	1.0973 *
Future neglect	−0.4572 ***	−0.4730 ***	−0.4234 **	−0.4243 **
Generativity	−0.6529 **	−0.7368 ***	−0.7785 ***	−0.6757 **
Positive time passage	0.1494	0.1704	0.2073	
40s–50s <sup>a</sup>		−0.2398	−0.2259	
60s–70s <sup>a</sup>		−0.2371	−0.3121	
Sex (Female)		0.1386	0.0535	
Middle income <sup>b</sup>		0.0163	−0.0800	
High income <sup>b</sup>		−0.0733	−0.1787	
Married		0.3084 #	0.2182	
Children living at home		−0.1888	−0.1434	
Middle municipalities (10,000+) <sup>c</sup>		0.1247	0.1445	
Large municipalities (30,000+) <sup>c</sup>		0.4484 +	0.3861 #	
Junior college graduate <sup>d</sup>		0.2358	5.1405 ***	5.2402 ***
University graduate or higher <sup>d</sup>		0.1466	2.8142 *	3.1277 **
Previous generation damaged the asset <sup>e</sup>	−0.1280	−0.0437	−0.0602	−0.0629
Next generation cannot use the asset <sup>f</sup>	0.2554 #	0.2394 #	0.2311	1.5951 +
x Creativity				−0.5690 #
<i>n</i>	960	883	883	885
Nagelkerke <i>r</i> <sup>2</sup>	0.110	0.127	0.188	0.183
AIC	936	846	819	807

Statistical significance: \*\*\* <0.001, \*\* <0.01, \* <0.05, + <0.1, # <0.2. Interaction terms were included in the analysis when the addition decreased the AIC and showed statistical significance. <sup>a</sup> Base age group was 20s–30s. <sup>b</sup> Base income group is low. <sup>c</sup> Base population is small (<10,000). <sup>d</sup> Base education level is high school graduate. <sup>e</sup> Dummy variable (0: Cases I and III, 1: Cases II and IV). <sup>f</sup> Dummy variable (0: Cases I and II, 1: Cases III and IV).

**Table 6.** Average marginal effect of factors that influence the decision about using and bequeathing a common asset.

Explanatory Variables	Model 1	Model 2	Model 3	Model 4
Altruism	0.1880 ***	0.1853 ***	0.1970 ***	0.2038 ***
Creativity	−0.0636 *	−0.0684 *	−0.0979 ***	−0.1022 ***
Future neglect <sup>a</sup>	−0.0940 ***	−0.0920 ***	−0.0783 **	−0.0789 **
Generativity	−0.1006 **	−0.1074 ***	−0.1080 ***	−0.0942 **
Married		0.0450 #	0.0303	
Large municipalities (30,000+) <sup>b</sup>		0.0637 +	0.0530 #	
Junior college graduate <sup>c</sup>		0.0344	0.0240	0.0239
University graduate or higher <sup>c</sup>		0.0219	0.0137	0.0176
Previous generation damaged the asset <sup>d</sup>	−0.0197	−0.0064	−0.0084	−0.0088
Next generation cannot use the asset <sup>e</sup>	0.0394 #	0.0349 #	0.0321	0.0347 #

Statistical significance: \*\*\* <0.001, \*\* <0.01, \* <0.05, + <0.1, # <0.2. The other explanatory variables shown in Table 5 did not show statistically significant results. <sup>a</sup> For comparison between 5-point scales and 4-point scales, the values of 5-point scales were multiplied by 4/3 to have the same interval of scales. <sup>b</sup> Base is small (population is smaller than 10,000). <sup>c</sup> Base is high school graduate. <sup>d</sup> Dummy variable (0: Cases I and III, 1: Cases II and IV). <sup>e</sup> Dummy variable (0: Cases I and II, 1: Cases III and IV).



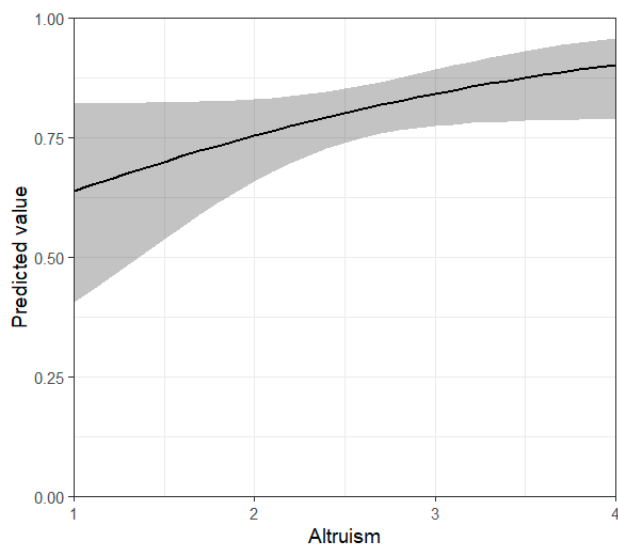
As shown in Table 6, four time-perspective scales (altruism, creativity, future neglect, and generativity) were identified as strongly significant explanatory variables in all the regression models (mostly,  $p < 0.01$  or  $p < 0.001$ ), but positive time passage scale and most demographic attributes were not statistically significant (discussed in Section 3.5). The altruism scale exhibited the largest average marginal effect and was the most influential explanatory variable for respondents choosing sustainable Option S.

The second largest absolute value of average marginal effects was that of the generativity scale. Even though generativity is considered to be a measure benefiting future generations because it represents the tendency to maintain an ongoing product, project, or tradition [30], the effect in this study was negative and statistically significant. The generativity scale of McAdams and de St. Aubin [30] used in this study consisted of statements such as “I feel as though my contributions will exist after I die”, “I have made an effort to convey my way of life to young people”, and “I try to pass along the knowledge I have gained through my experiences” (see Supplementary Materials S2 for all the statements used). This scale cannot be regarded as generativity purely for future generations but as generativity centered on the current generation. In this regard, it makes sense that the traits of this scale could result in a negative relationship with sustainable choices for future generations. When using a generativity scale for the intergenerational allocation of assets, we should interpret the results cautiously.

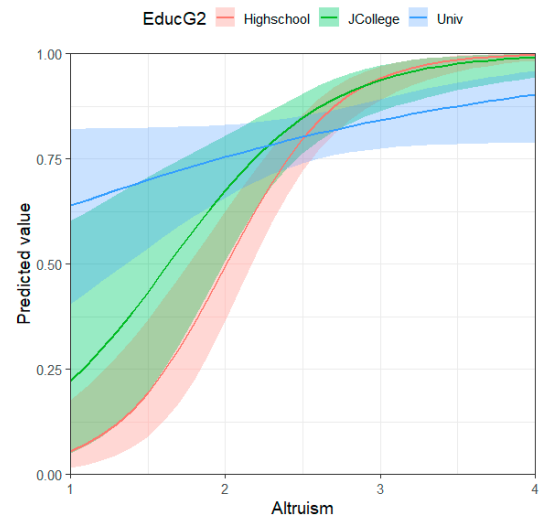
The average marginal effects for the future neglect and creativity scales were negative and statistically significant. The average marginal effects of these scales were less than half those of the altruism scale (Table 6). Here, the future neglect scale consisted of “I am fine as long as it is fun now”, “I don’t have to have prospects for the future”, and “It is no use thinking about the future that I do not know”. It is not surprising that indifference towards the future, like short-termism, undermines the intention to take future generations into consideration. However, it is not clear why creativity is affected. One interpretation is that creative people have many ideas about how to cope with difficult situations in the future and thus tend to choose the unsustainable Option A because they believe that an unsustainable situation could be overcome. This interpretation may be related to the positive time-passage scale used in our study because the view is related to one’s prospect of the future; however, the influence of the positive time-passage scale was not identified. Therefore, this could be explained by a purely optimistic aspect of creativity. Another interpretation is that they expect to bequeath to the next generation other assets that they create instead of a common asset. This interpretation involves the idea of an offset and a compensatory aspect. Further studies are required to confirm what is the cause of the influence of creativity.

As the regression coefficients of the interaction terms in Models 3 and 4 show, creativity reduces the influence of altruism ( $p < 0.01$  and  $p < 0.05$ ). In these models, the regression coefficient of creativity was not statistically significant ( $p > 0.2$ ). This suggests that creativity does not directly influence intergenerational choice but does affect the choice by undermining altruism.

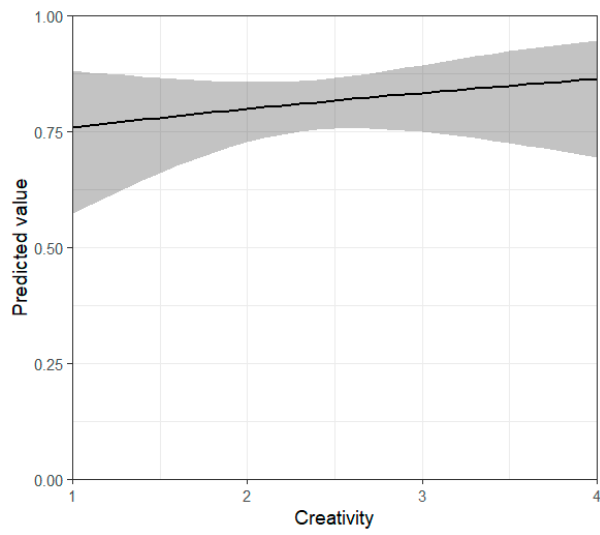
A graphical representation of how these time-perspective scales influence choices is shown in Figure 1. As can be seen in Figure 1a,c,e,f, altruism is a promoting factor, and future neglect and current-generation-oriented generativity are hindering factors for the choice to benefit future generations. Creativity does not affect the choice directly (Figure 1b,d are discussed in Section 3.5).



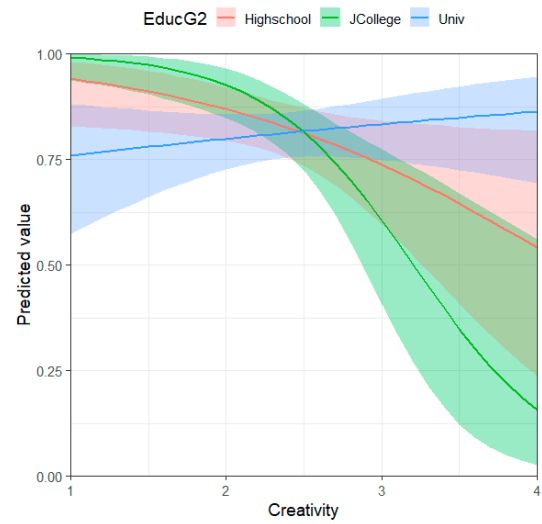
(a)



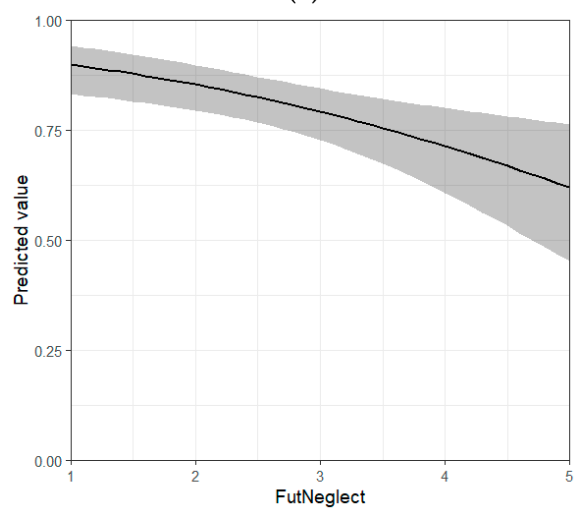
(b)



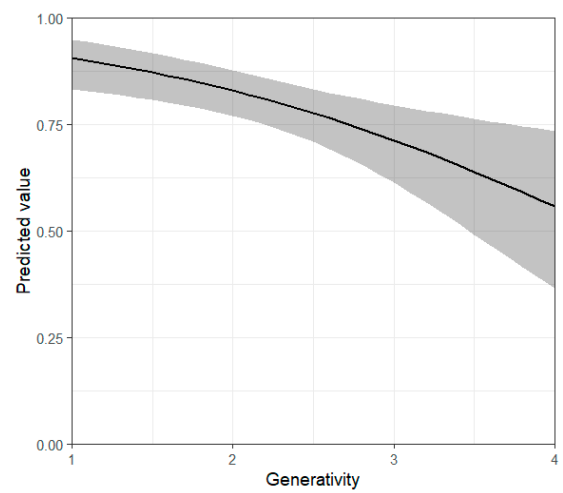
(c)



(d)

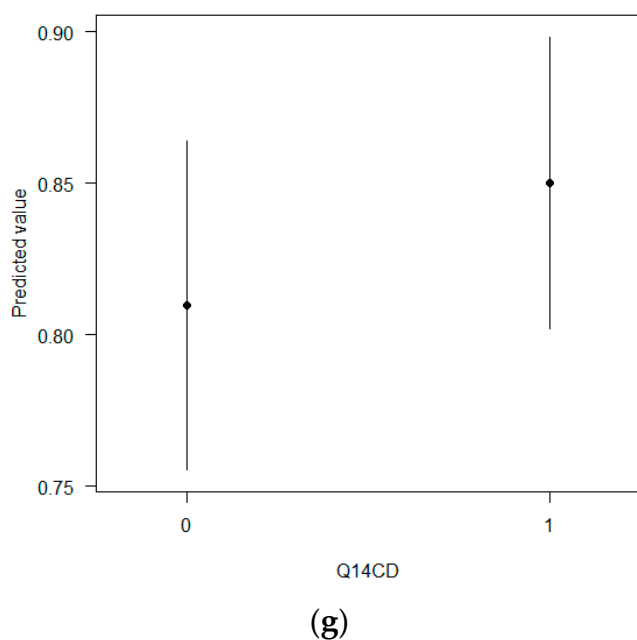


(e)



(f)

Figure 1. Cont.



**Figure 1.** Graphical representation of the effects of time-perspective scales on decisions about using and bequeathing a common asset (Model 4): (a) Altruism scale, (b) Altruism scale by final education, (c) Creativity scale, (d) Creativity scale by final education, (e) Future neglect scale, (f) Generativity scale, (g) Next generation cannot use the asset. The lines in the graphs indicate the predicted values of the probability of choosing sustainable Option S, and the grey areas indicate the 95% confidence range of the predicted values. The point in (g) similarly shows the predicted value and 95% confidence range.

### 3.4. Discussion about Two Treatments

The cases in which the respondents knew that the “previous generation damaged the common asset” did not exhibit statistically significant differences in the results of regression analyses (Table 5), although the results in Table 4 indicated a possible influence. Timilsina et al. [37] showed in their ISDG involving 102 Nepalese that a previous generation’s decision did not influence the choice in a statistically significant way ( $p > 0.1$ ). Our study also confirmed this finding with a larger population of Japanese ( $p > 0.4$ ).

In contrast, information about the next generation’s unavailability still influenced the intergenerational choice with a weak statistical significance ( $p < 0.2$ ), as shown in Tables 5 and 6 and Figure 1g. This tendency is similar to the behavior of conditional cooperators [49,50], a term that refers to individuals being willing to engage in cooperation depending on the degree of cooperation of others. Interestingly, the tendency to choose the sustainable Option S was weakened by creativity (see the interaction term in Table 5), and the inclusion of the interaction term made the tendency stronger (the regression coefficient became 1.595) with more statistically significant ( $p < 0.1$ ). Even if creative people know that the next generation will be in trouble, they tend to disregard it. This result should be confirmed by a study with a large number of respondents to gain stronger statistically significant results.

### 3.5. Discussion on Demographic Attributes

Age group, sex, household income, children living at home, and the level of final education did not show any statistical significance, while marriage and living in large municipalities showed weak statistical significance. As mentioned in Section 2.4, age [17] and rural areas [33,34] had statistically significant differences in several cases, whereas gender, education, income, and single family did not [34]. Even when we identified statistically significant differences, the average marginal effects were smaller than those we found for the time-perspective scales, and the level of statistical significance was weaker

( $p < 0.1$  or  $p < 0.2$ ). It seems possible to conclude that demographic attributes were not important, influential factors for intergenerational choices in this survey with a larger size of respondents.

The result that married persons weakly tend to choose sustainable Option S is intuitively reasonable and can probably be attributed to their less individualistic aspect. Another result is that persons living in large municipalities weakly tend to choose the sustainable Option S, which contradicts the results of Shahrier et al. [36] and Timilsina et al. [37]. However, these studies cannot be compared because different control variables were used, the surveys were conducted in different countries (Shahrier et al. [36] for Bangladesh and Timilsina et al. [37] for Nepal), and these two studies addressed group decisions, not individual choice. Further studies are needed to confirm the influence of population size.

Final education level was a complex factor. It did not directly affect the intergenerational choice (see the regression coefficient of Model 2 in Table 5 and average marginal effects in Table 6) but affected the degree of influence of altruism and creativity (see those of the interaction terms of Models 3 and 4). As shown in Figure 1b,d, university graduates tend to be less affected by altruism and creativity. High school graduates and junior college graduates who are altruistic and less creative tend to choose the sustainable Option S slightly more than university graduates; however, low altruism and high creativity hinder high school graduates and junior college graduates from choosing the sustainable option to a larger extent than university graduates. On the one hand, the results about altruism may suggest that higher education might be able to make up for the lack of altruism through improved anticipatory capability while weakening the level of altruistic empathy by logic. On the other hand, the results for creativity may indicate that different types of creativity exist. One is creativity for future generations, which is shown by the results of university graduates. The others are optimistic creativity and compensatory creativity, both of which consider future generations less, as discussed in Section 3.3. More studies are needed to confirm the different types of creativity and their influence.

We expected that the more income the respondents had, the more they could afford to pass on assets to the next generation; however, household income was not identified as a statistically significant explanatory variable. There may be differences between attitudes towards common assets and an individual's (or a family's) assets. Further investigations into this aspect are also necessary.

### 3.6. Implications for Psychological Conditions That Benefit Future Generations

Finally, based on the results, we discuss the psychological conditions that may facilitate the consideration of future generations. First, as we have seen, future neglect was an important factor that negatively affected the consideration of future generations, whereas a positive time passage did not affect it. This leads us to the first hypothetical condition, namely that it is important to look at the future, but it is not essential to know what the nature of the future is likely to be. In other words, a person is likely to think about future generations if the person has an opportunity to think about the future, regardless of whether the future looks better or worse, and if their scope of the future spans to the next generations, not just a couple of months or years. The length of the time horizon with which they think about the future is supposedly a key aspect of whether they consider future generations or not.

Second, the observation that creativity reduced the percentage of respondents who chose the sustainable option may enable us to interpret that a person is less likely to care for future generations if they perceive that the future can be controlled to a certain extent by the power of creativity. Another possible reason why creative persons are less likely to care for future generations is that they may justify themselves as having made more contributions to society than others.

Third, in contrast, it seems that general altruism in the current generation promotes choices that are more favorable to future generations. Kamijo et al. [21] and Shahan et al. [22]

found that pro-social university students who participated in the ISDG tended to choose sustainable options. Our results confirm the same results for other age groups. Kamijo et al. [21] also showed that the inclusion of fewer pro-social participants in a group makes the decision lean towards taking an unsustainable option. Therefore, the third hypothetical condition is that the altruism of the current generation must be strong enough not to be undermined by the incentives and contexts.

#### 4. Conclusions

In this study, we conducted an online survey engaging a variety of participants with ages ranging from 20 to over 70 years. We asked the participants to decide how much of a common local asset they would use while considering the remainder of the asset that future generations can use in order to explore the factors influencing their intentions to consider future generations. The factors surveyed were five time-perspective scales, which were selected based on the insights from the psychology literature, demographic attributes of the respondents, and the provision of two types of information. The main conclusions are as follows:

- Of the five time-perspective scales analyzed, altruism was the most important factor associated with the intention to consider future generations. Among the respondents, university graduates were less influenced by altruism;
- Future neglect is another important—albeit negative—factor associated with the intention to consider future generations;
- Creativity and generativity scales were also negatively correlated with making beneficial decisions for future generations. Creativity conditionally affected and undermined the influence of altruism. The influence that creativity had on decisions for future generations differed by the final level of education. However, further studies are needed to understand how these two scales influence intergenerational decisions;
- The impact of these time-perspectives scales on the intergenerational decision is significantly larger than that of the analyzed demographic attributes.

Based on these conclusions, we propose three hypothetical psychological conditions that support the benefits for future generations: the length of time horizon of the future, a negative aspect of creativity, and sufficient altruism. The accuracy and reproducibility of these conditions need to be examined in future studies.

The main limitations of this study are two-fold: our study (1) was not designed to consider the group effect and deliberation process, and (2) it did not provide any real incentives. Future studies should compare experimental conditions with and without group deliberation, as well as with and without monetary incentives for various groups of people. These studies will show the gaps between behavioral intention and behavior and possibly provide ideas for the mechanism design of institutions for future generations. Nonetheless, this survey elucidated the relationships between decisions made for future generations and the factors that influenced the decision in the absence of monetary incentives by examining a wider range of the general public than in previous studies. Further studies are expected to provide a more holistic understanding of how humans intend to act with regard to future generations. Comparison of behavioral intention between different countries and cultures also remains a future research task.

**Supplementary Materials:** The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/su152014832/s1>. Supplementary Materials S1: Explanation and question used in the four cases; Supplementary Materials S2: Statements of time-perspective scales; Table S1: Results of factor analysis of time-perspective scales.

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