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Caring for Things Helps Humans Grow: Effects of Courteous Interaction with Things on Pro-Environmental Behavior

Hiroko Kamide [1,*] and Tatsuo Arai [2,3]

[1] Institute of Innovation for Future Society, Nagoya University, Furocho, Chikusaku, Nagoya 464-8601, Japan
[2] Center for Neuroscience and Biomedical Engineering, The University of Electro-Communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585, Japan; tarai118@jcom.zaq.ne.jp
[3] Beijing Advanced Innovation Center for Intelligent Robotics and Systems, Beijing Institute of Technology, No. 5, Zhongguancun South Street, Haidian, Beijing 100081, China
* Correspondence: kamide@coi.nagoya-u.ac.jp; Tel.: +81-52-788-6006

Abstract: The purpose of this study was to clarify the influence of courteous interaction with familiar objects on pro-environmental behavior and well-being. We explored the process of interaction with everyday objects, such as pens and glasses in a preliminary study (N = 64), and to reveal two aspects that define these interactions, namely active care for objects and awareness of learning from the interaction (N = 687; Study 1). The more people cared for and learned through their interactions with a particular object, the more they perceived a connectedness to it (N = 195; Study 2). Furthermore, caring for and learning with familiar objects promoted various environmentally conscious behaviors and contributed to individual well-being (Study 3; N = 600). In this way, we discussed the relationship between interaction with everyday objects, the aspects of these interactions, and the influence of these interactions on an individual's perspective toward the wider environment.

Keywords: pro-environmental behavior; care; learn; courteous interaction; familiar objects

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1. Introduction

1.1. Interaction with Familiar Things and Consideration for Nature

"Making things is developing people" is a popular saying concocted in a robot contest that started over 30 years ago in Japan and is now popular all over the world. Robot contests have an educational significance, rather than focusing on winning or losing the competition [1]. It is expected that as students get absorbed in the process of making robots, they will learn courteous manners to deal with ordinary little things around them, such as tools and small parts, and thus, will ultimately learn not to waste these things. Mori, the founder of the robot contest, argued that reverence for nature is the foundation of robot development, without which neither education nor coexistence with nature would be possible [1]. He also reported that students wrote in their testimonials after the robot contest that they now felt they could never do things poorly or in a rough manner, and that they had become more considerate of other people and things [2]. The focus of this research is to explore how the interactions with objects used by people daily will affect their behavior toward the wider natural environment. In the everyday workplace, people use various tools to perform their jobs and most of them simply use these objects for the purpose of mastering them to effectively accomplish their goals. However, interacting with these objects and tools in a courteous manner could have the potential to develop the user's connectedness to them and lead the user to become more environmentally conscious and friendly, as observed in the students who participated in the robot contests.

The focus on courteous interaction with familiar objects will provide a new angle in the science of sustainability, especially in the psychology of sustainable development and sustainability. The general definition of sustainability dates back to the World Commission on

Environment and Development (WCED) in the 1980s [3], where sustainability was defined as satisfying the needs of the present generation without compromising future resources, and maintaining a delicate balance between economy, environment, and society [4]. In the 2030 Sustainable Agenda, the United Nations identified sustainability as one of the main drivers of today's industrial development and strategies [5]. Di Fabio and Rosen [6] argued that the psychology of sustainable development and sustainability [7–9] is a relatively new area of research, and that a psychological perspective applicable to the environment will strengthen the disciplinary outline of sustainability science. They also discuss that central to this field is well-being and the focus is on evaluating psychological aspects to achieve the United Nations Sustainable Development Goals [10]. Identifying the psychological aspects associated with these globally defined goals is useful for understanding how well those goals are being achieved. On the other hand, given that sustainability is about meeting today's needs without depleting future resources, it would be important to consider how our daily interactions with objects relate to our actions to protect future resources.

There have been remarkable reports discussing that connectedness between nature and the self is related to environmental concerns. The concept of connectedness means that one believes that one is part of the natural environment [11–13]. Such a sense of connectedness is the basis of people's attitudes toward the environment and is related to their interest in environmental issues as well as their decision to engage in pro-environmental behavior (PEB) [14]. PEB means to minimize the negative effect and foster the positive effect of one's activities on nature [15]. In addition to studies that focus on the impact of behaviors, there are also studies that focus on intentions toward the environment [16–18]. People with a meta-personal self-construal, in which individuals perceive that they are fundamentally interconnected with all living things, tend to have biospheric values in which people evaluate phenomena based on costs or benefits to biosphere and take cooperative actions with due consideration for the environment, even in the dilemma of common ground [19]. Emotional connections to nature also influence the intention to engage in PEB [20]. In a study by Frankel et al. [21], a factor that influenced connectedness with nature was forest visits, and the study revealed that this effect does not differ depending on cultural background. Importantly, in another study, nature visits were related to general health, and PEB and connectedness with nature were positively associated with well-being [22].

Various factors, such as education and experience have been reported regarding the process of developing such self-views, values, and feelings. It was found that people who spent time in nature as children were more likely to engage in PEB as adults [23]. In addition, parents' internalization of PEB motivation and parenting techniques that support children's autonomy are also related to children's PEB motivation [24]. It has been reported that simply reading "Silent Spring" by Rachel Carson was also associated with a high frequency of PEB [25]. The relationship between PEB and connectedness with nature has been shown through empirical evidence and it has been revealed that the motivation and intention to contribute to PEB could be fostered in several ways. However, the aforementioned studies, including literature reviews about connectedness with nature, have examined the effects and concepts that are directly associated with nature. To the best of our knowledge, there seems to be a lack of evidence about the effects of interaction with familiar objects around people that may not seem directly linked to environmental issues and the influence of these interactions on PEB. The students who participated in the robot contests apparently took care of other objects, and through their interactions with familiar tools and things, they psychologically developed thoughtful attitudes that applied to a wider range of objects and behaviors. In this context, what does the psychological process of interacting with familiar things, such as phones, books, and so on in a courteous way mean? In this research study, we aimed to explore people's interactions with everyday objects and to examine the relationship between such interactions and perceived connectedness. Furthermore, we explored how the manner of interacting with familiar objects affects PEB and well-being. In conclusion, this study aims to: (i) Discover the manner of interaction with familiar things from a psychological point of view and develop a measurement scale

to evaluate these interactions; (ii) reveal the effect of dealing with things with courtesy on perceived connectedness to them; and (iii) reveal the effect of dealing with things with courtesy on several kinds of PEB and individual well-being.

1.2. Concerns and Values Related to PEB

Faced with the greatest challenge of sustainable development on our planet, various initiatives are being pursued with the aim of promoting PEB. In recent years, the concept of biospheric values has been particularly attracting a lot of attention. Stern and Dietz [26] consider values to be a criterion that guide behavior to maintain and build attitudes, and discuss that value orientation is formed in the process of socialization and is fairly stable after adulthood. They argued that people's attitudes toward the environment are based on their perceived relative significance of themselves, others, and plants and animals, and the following three values affect PEB. First, egoistic values are related to personal aspects of environmental issues; if some aspect of the environment affects an individual personally, they either try to protect it, or oppose it if they perceive that the individual costs to protect it are high. Second, altruistic values are the basis of pro-environmental attitudes, and those who possess such values judge costs and benefits at the community level including social and ethnic groups. Third, biospheric values have received a great deal of attention from many ecologists; they are related to a phenomenon in which people evaluate costs and benefits based on consideration for ecosystems and the biosphere. It should be noted that in this study, personal norms regarding the treatment of non-human objects have been specified in the context of biospheric values, although Stern and Dietz [26] mentioned "other species," and did not explicitly include inanimate objects or artifacts in their study.

Empirical studies of the above-mentioned values and concerns have also been conducted. Schultz [12] revealed a three-factor environmental concerns model of self, other people, and the biosphere, based on the idea that value orientations predict general concerns about the consequences of environmental problems. This model has proven to be applicable to students as well as adults and to people from different cultural backgrounds. In the survey, biospheric concerns included items, such as "plants," "marine life," and "animals," and as a result, altruistic concerns correlated to self-transcendence positively, while egoistic concerns correlated to self-transcendence negatively. In another study, it was claimed that self-transcendental values are reinforced when people start families, because they begin to pay more attention to the well-being of others rather than their own [27]. Family could be considered as a typical example showing that consideration for targets other than oneself may ultimately be related to environmental awareness and PEB. Further, the concept of mindfulness, that is awareness without self-centeredness and judgments, has also drawn attention in this regard because it has the potential to foster a bond with nature that would promote PEB. In Schutte and Malouff [28], a meta-analysis showed a relationship between trait mindfulness and connectedness with nature. Tang et al. [29] showed that biospheric mindful learning, rather than mindful learning about the self, improves intention to engage in PEB.

One of the practices to protect the environment is not to be self-centered, but to be mentally conscious of other beings with courtesy and respect, and express these attitudes behaviorally. As described above, previous studies have primarily focused on behaviors and values that are directly connected to environmental issues. In this study, our concern is whether the manner of interaction with physical objects that are available for everyday use and that do not explicitly seem to be related to the environment will lead to PEB or not. Educational programs for environmental protection, mindful learning, and other interventions to support PEB are explicitly conducted at a specific place and time, whereas interaction with everyday objects is a casual action that may be practiced for a long time. Some people may deal poorly with objects even though those objects are necessary for their work, while others may handle them carefully and politely either consciously or unintentionally. A precise evaluation of such everyday actions for familiar objects from a bottom-up approach and an examination of their relationship with PEB is also one of

the fundamental questions about solving environmental problems. Specific PEBs, such as garbage classification and recycling may be predicted by how people interact with everyday objects around them. As a matter of course, a single action in handling objects, such as computers, notebooks, and pens would not directly affect the environment dramatically. However, the accumulation of these actions over a period will have a great impact on the environment in one or the other way. Furthermore, all things that we use are originally made from natural materials, thus, treating the objects around us could be related to consideration of nature and natural resources. And as will be discussed later, PEB is associated with well-being. Therefore, in this study, we aimed to explore the psychological process of interacting with familiar objects with courtesy in relation to PEB and well-being.

1.3. Connectedness with Nature and Things

Interestingly, a study by Schultz [12] regarding connectedness with nature, using the Inclusion of Other in Self (IOS) scale [30], which measures the degree of overlap between two circles as an inclusion of the target (nature in this case) into the self-concept, showed that biospheric concerns and the score on IOS were correlated positively. This means that the higher the biospheric concerns, the stronger the perception that one is fused or connected with nature. Martin and Czellar [31] examined how biospheric values are developed and found that feeling a connection to nature contributed to developing biospheric values, and that biospheric values were associated with various sustainable behaviors. Emotions, such as passion and intimacy for nature have also been shown to encourage green purchasing and recycling [32]. And importantly, the experience of visiting a forest promotes connectedness with nature [21]. If such a behavioral experience is related to connectedness with nature, it could also be possible that interacting with familiar objects with courtesy is related to connectedness with the object. Of course, conversely, a high sense of connectedness with an object may make the interaction courteous, but in this study, we investigated exploratorily whether interaction with an object with courtesy influence connectedness with that object.

1.4. Interaction with Objects, PEB, and Well-Being

PEB is often discussed in terms of its negative impact on well-being because it requires sacrificing short-term gains [33]. However, with regard to social well-being, it has been shown that energy-saving behaviors can promote well-being, and it has been suggested that this is because environmental protection behaviors with intrinsic positive value led to favorable evaluations [34]. They also argued that environmental protection behaviors may require at least some sacrifice, but once habituated, their costs may be perceived as low and beneficial. Therefore, if courteous interactions with familiar objects successfully lead to PEB, PEB could thereby promote well-being. There are other variables such as intrinsic value and mindfulness [35] may underpin or neutralize these relationships. However, given the discrepant results, it is necessary to clarify the impact of PEB on well-being in the context of interaction with objects. Therefore, we investigated if interacting courteously with objects promotes PEB and whether it positively affects individual well-being.

Thus, the goal of this study is to examine the impact of interaction with familiar objects on PEB and well-being in addition to connectedness with objects, but the ways in which they are related are diverse. In some cases, high levels of well-being may influence frequent PEB and taking care of familiar objects, while in other cases, the external variable of high levels of economic status may facilitate these three variables simultaneously. This study does not intend to dismiss these possibilities, however, understanding the process of interaction with familiar objects will provide a new understanding of the possibility of human-nonhuman interdependence, which may have some function as an influencing factor on PEBs that are to live in harmony with nature. In the case of the robot contest, it was reported that students who are concentrating on interacting with the tools gradually realized that they were not only using things, but that the outside world was also working towards them [2]. It does not necessarily mean that non-human entities possess agency, but

physical contact with objects makes people subjectively aware of their interactivity with non-human entities. The fact that visits to the forest affects connectedness with nature [21] suggests that physical experiences with non-human beings can lead to a subjective oneness with them. In contrast to the case of the forest visit, however, the interaction with objects requires more active concentration on the part of the person in contact with them and intentional control of physical operations. It may take effort to behave courteously towards non-human objects that do not show obvious resistance or admiration towards humans. However, if people are engaged in such practices on a daily basis, it will lead an experience that makes people aware of their connection to non-human objects, and will lead to a broader consideration of nature. In this sense, it is practically important to examine the effects of interaction with everyday objects, given that many people have the opportunity to interact with familiar objects on a daily basis.

This study explores what kind of PEBs are affected by the interaction. The measurement of PEB includes recycling [36–38], reuse [39], and not wasting [40]. If the act of not mistreating the things such as notebooks or tools, reflects these PEBs, they may not be conceptually different from courtesy toward objects very much, or may be overlapping. However, PEB is not limited to such manipulation of objects. It can also include keeping track of own congressman's voting records on environmental issues [41,42], participating in environmental protection events [43], discussing the environment with others [44], saving electricity [45], and water [43,46], and purchasing environmentally friendly products [47]. Given this diversity of PEBs, it will be necessary to explore the effects of interaction on a variety of PEBs, including those that do not directly mean to handle objects.

2. Overview of the Studies

In Study 1 we aimed to clarify the process of interacting with familiar objects with courtesy. To achieve this goal, we asked various people to specifically describe their interaction with objects in a courteous way, setting a wide range of targets, from practitioners who handled the objects carefully to regular workers who may use tools in a normal or rough manner. We found that, generally, people practicing calligraphy, tea ceremony, flower arrangement, judo, kendo, etc., deal with specific tools in their activities and they are particularly careful in the handling of those things. Practitioners engaged in these activities not only operate the tools properly but also are careful about how they are stored while not in use. In this sense, they are good at interacting with their tools in a courteous way. In the first half of Study 1, to gain a comprehensive description of interaction with objects in a courteous way, we conducted a free-form survey among practitioners engaged in various activities and ordinary workers who are not practitioners. In the latter half of Study 1, we created question items that quantified the manner of interaction with objects based on the obtained descriptions. Then, another sample of ordinary workers selected one of the objects used in their work and evaluated it using the question items. By performing exploratory factor analysis with the scale scores, we clarified the factor structure of interaction with things in a courteous way along with the reliability of the factors.

In Study 2, respondents identified one item that they use at work and evaluated how they usually interact with that object, on the developed scale. We also asked them to evaluate the object on the scale based on IOS to explore whether courteous behavior toward a particular object affects connectedness with that object.

Study 3 investigated the effect of interaction with objects in a courteous way on various kinds of PEB and on individuals' well-being. Although various methods have been pointed out regarding measurement of PEB [48], the focus of this study is to find whether interaction with objects is generally associated with behavior in consideration of a wider environment. For this purpose, PEB that is likely to be performed daily was widely measured. For assessing individual well-being, the individual's perceived life satisfaction was measured with a scale that is widely used as a measure of well-being in positive psychology.

The research company recruited participants under our instructions and provided informed consent for participations and collected the data for the following three studies. The company adheres to the laws, national guidelines, other norms, and the Code of the Japan Marketing Research Association. This company has a panel of 4.7 million people. In order to ensure the reliability of the panel's responses, this company's data cleaning process is based on the experience of its full-time academic staff, who set the criteria for valid votes for each survey. For all studies, an email requesting participation in the study will be sent to monitors who meet the target demographics. The monitors who decide to participate in the study will then answer screening questions to see if they fit the age, gender, and so on set for each study. Inappropriate responses such as rating all scale items as "1" were removed. The survey will be closed when the number of applicants is reached, which will take roughly one week. All participants in this study are Japanese. However, we have also discussed the influence of cultural background in the discussion section (Section 6).

3. Study 1

In Study 1, we first collected descriptions from participants about their interactions with various objects. Then, we created question items based on the obtained descriptions, and another sample of participants reported a quantitative evaluation of their interactions with specific objects based on these questions. We then conducted an exploratory factor analysis to reveal the factor structure of interaction with objects.

3.1. Method

Free Description Survey

A total of 10 participants for each activity including calligraphy, tea ceremony, flower arrangement, judo, and kendo, participated. They are practitioners in their respective fields and interacted with the concerned objects in a courteous way. Practitioners who were engaged in any of the activities for more than three years and practiced the activity more than once a month participated in the survey. A total of 30 ordinary workers also participated who were performing other jobs apart from the activities mentioned above. We excluded 16 participants from the analysis based on their answers to a question that was asked to identify some familiar objects specifically; those who answered "Nothing" to this question were excluded. The resulting number of participants was N = 64 (50% males, 23 workers, age: average = 54.25 years, SD = 14.82, range = 30−86 years). The number of participants who are practitioners, their years of experience, and frequency of engagement in each activity were as follows: calligraphy (N = 7, $\text{average}_{\text{year}}$ = 6.86, SD_{year} = 4.38, $\text{average}_{\text{frequency}}$ = 1.71, $\text{SD}_{\text{frequency}}$ = 1.11); tea ceremony (N = 8, $\text{average}_{\text{year}}$ = 9.38, SD_{year} = 9.10, $\text{average}_{\text{frequency}}$ = 3.88, $\text{SD}_{\text{frequency}}$ = 2.75); flower arrangement (N = 10, $\text{average}_{\text{year}}$ = 11.00, SD_{year} = 11.55, $\text{average}_{\text{frequency}}$ = 3.30, $\text{SD}_{\text{frequency}}$ = 1.42); judo (N = 6, $\text{average}_{\text{year}}$ = 10.67, SD_{year} = 10.48, $\text{average}_{\text{frequency}}$ = 9.00, $\text{SD}_{\text{frequency}}$ = 10.92); and kendo (N = 10, $\text{average}_{\text{year}}$ = 11.40, SD_{year} = 14.26, $\text{average}_{\text{frequency}}$ = 6.50, $\text{SD}_{\text{frequency}}$ = 8.80). The aim was to gather as many comments as possible about interaction with objects in a courteous way. We asked participants to identify and list up to 10 objects they use in their activities or jobs. Then, we also asked them to describe up to 20 points about what they were aware of in interacting with those objects in a courteous way, in as specific and detailed manner as possible. The average number of objects were 4.78 (SD = 2.90) and the average number of descriptions were 3.14 (SD = 2.15, range = 1−12). Those who practiced calligraphy selected brushes, inkstones, and paperweights as their familiar objects; those who were engaged in tea ceremony selected bowls, tea whisks, and tea scoops; those who did flower arrangements picked scissors, pin holders, and vases; those who performed judo chose judo wear, belts, and mats; and those who performed kendo chose masks and protective mittens for forearms and torso. Workers chose personal computers, smartphones, pens, glasses, bags, and so on.

3.2. Results

A total of 196 descriptions were obtained. Two authors classified these statements based on content. As shown in Table 1, all descriptions were divided into five categories. The first was the maintenance of objects including cleaning, repairing, and organizing them when they are not in use. It seems that the maintenance of specialized tools and familiar items, even for different types of activities and by practitioners as well as ordinary workers, is an element of courteous interaction with objects. The second category reflected awareness of changes in the users' perspectives about these objects, including the recognition that caring for things can make them last longer, and the experience of being grateful for these things. All the practitioners and workers also wrote some statements in this category. The third category was related to actions involving care and consideration while using the object, and included using the object with care so that it does not break or become dirty. There was no description from Kendo practitioners in this category, but there was a related description of "safety" which might imply "using bamboo swords in a safe way." However, this answer was included in the "Other" category because there could be diverse interpretations of this word (safety). The next category meant awareness of change in views of oneself and human beings, including the experience of learning interpersonal respect and cultivating self-control through interaction with objects. Some comments in this category suggested that operation to objects was improved through interaction with objects. The "Other" category included peripheral content, such as preparation before use, selection of what to use, and saving money by using things well. Since the number of worker participants was originally large, there were more descriptions by workers than by practitioners of each activity. The category of "change in view of the self or humans" mainly contained descriptions by practitioners, and there were very few statements from workers in this category. Interestingly, in "change in view of things," there were some descriptions that implied that interaction with a particular object changed their perspective regarding other objects. That is, despite being questioned about interactions with specific objects, participants mentioned interactions with other objects as well. Since this result cannot be arbitrarily ignored, these descriptions were also added in the creation of question items. As a result, multiple elements of courteous interaction with things were obtained by targeting practitioners in various activities and ordinary workers.

Table 1. Categories and descriptions of interaction with objects.

Category	Examples of Obtained Descriptions	*N*	*N*
Maintenance	C: After using my brush and my ink stone, I wash them clean.	8	67
	T: After using the bowls, I dry them well and then put them back in the right place in the right order.	8	
	F: I wipe the scissors' blade with a dry cloth after use to prevent it from rusting.	9	
	J: I always keep my Judo uniform and mats clean.	6	
	K: When a bamboo sword is flaked, I cut it off.	18	
	W: I clean and manage (computer, shaver, etc.) daily.	18	
Change in view of things	C: I came to value things.	2	44
	T: I learned the importance of things in general.	4	
	F: I understand that if I handle it carefully, I can use it for a long time.	8	
	J: I now know to appreciate it including other things.	1	
	K: I learned to appreciate it as well as other things.	5	
	W: If I take care of glasses, they will last longer.	24	
Treatment	C: I use it so that the tip of the brush does not have a strange shape.	2	39
	T: I do not wear a ring so as not to damage the tea ware.	8	
	F: I treat the vase with care so as not to break it.	5	
	J: I take care of how to move my legs on the tatami mat.	1	
	K: (No applicable answer)	0	
	W: I take care not to get the suit dirty.	23	

Table 1. *Cont.*

Category	Examples of Obtained Descriptions	*N*	*N*
Change in view of the self or humans	C: I learned that treating tools carefully is reflected in calligraphy works.	7	38
	T: I got to know about respect for each other.	12	
	F: I found that those who treat their tools with care improved quickly.	8	
	J: I learned self-control.	3	
	K: I learned not to give up and to get things done to the end.	6	
	W: I acquired new knowledge.	2	
Other	F: I prepared flowers so that they are easy to arrange. J: I prepared many Judo uniforms and belts. K: Safety. W: I have come to save money.		8
Total			196

Note. C = practitioners of calligraphy, T = practitioners of tea ceremony, F = practitioners of flower arrangement, J = practitioners of judo, K = practitioners of kendo, W = workers.

The category of "maintenance" or "treatment" seems to refer to how people handle, store, and maintain things with care. The remaining two categories, except for "Other," seem to reflect the awareness that one's perspective changes through interaction with things. We created a few question items in each category except for "Other" based on the descriptions obtained, and developed a scale for evaluating interaction with a specific object. Even if the target objects are different, the content of the interaction is duplicated and summarized as an abstract expression to the extent that interaction with any object can be evaluated. In the end, we obtained 16 question items from the descriptions (Table 2).

Table 2. The factor structure, inter-factor correlation, and alpha reliability of the two factors.

Items	Factor 1: Learn	Factor 2: Care
I have learned how to be nice to other people using the tool (object).	**0.96**	−0.09
Using the tool (object) builds my mental strength.	**0.94**	−0.06
I have learned how to control myself by using the tool (object).	**0.92**	−0.08
I have built a respectful attitude toward objects by using the tool (object).	**0.91**	−0.01
Using the tool (object), I have come to treat other objects thoughtfully.	**0.90**	0.03
I have come to use other tools carefully by using the tool (object).	**0.84**	0.10
Using the tool (object), I have come to appreciate objects more.	**0.78**	0.13
Using this tool (object), I have acquired good manners of physical operation toward other objects.	**0.76**	0.07
I make it a point to handle the tool (object) carefully.	−0.03	**0.93**
I take great care not to break the tool (object).	−0.07	**0.91**
I try not to handle the tool (object) roughly.	−0.04	**0.88**
After using the tool (object), I keep it tidy and in complete order.	−0.09	**0.85**
I keep things organized when using the tool (object).	0.04	**0.83**
I try to keep the tool (object) clean.	0.07	**0.80**
I use the tool (object) neatly so that it does not get dirty.	0.07	**0.78**
I try to use the tool (object) gently.	0.15	**0.77**
Inter-factor correlation	Factor 1	Factor 2
Factor 1	1.00	0.52
Factor 2	0.52	1.00
Reliability	0.97	0.95
Mean (SD)	4.37 (1.36)	5.24 (1.17)

3.3. Method

Survey for Exploratory Factor Analysis

The factor structure and reliability of the created scale were examined. We administered the scale to participants engaged in different occupations and assessed their interaction with everyday objects used at work. To capture a more general trend, we targeted all the occupations and part-time jobs in an online research firm. The occupations and

part-time jobs were classified into the following eight types: 1. Sales, planning, marketing, clerical work, staff, etc.; 2. Creative occupations; 3. IT/software-related occupations; 4. Occupations related to production, manufacturing, and quality control; 5. Occupations related to research, development, and design; 6. Occupations related to architecture and civil engineering; 7. Distribution and service-related occupations; and 8. Part-time jobs. For each occupation, about 70 people (range = 73−80; 148 in the case of part-time workers) with an equal male/female ratio were recruited, and a total of 687 people (345 men, average age = 44.72 years, SD = 13.14, range = 20−69 years) participated in the study.

Respondents first identified one of the tools and things that they use most at work and wrote it down. At this stage, they were instructed to select physical objects rather than software or programs. Next, they answered their manner of interaction with the selected objects based on the 16 questions. They were instructed: "Please read each of the following statements, please answer to what extent it applies to the interactions between you and the tool (object) on a 7-point scale (1 = Not at all applicable to 7 = Fully applicable)."

3.4. Results

Exploratory factor analysis of the 16 items using promax rotations was conducted. The Kaiser's criterion of eigenvalues greater than 1 yielded a two-factor solution explaining 78% of the variance. All items in this analysis had primary loadings over 0.7 and the communalities were all above 0.6. The factor loading matrix for this solution and alpha reliability is presented in Table 2.

These factors formed the basis of the two aspects of interaction, which were labeled as "learn" and "care" (Table 2). The "learn" factor reflected that people develop mentally through handling an object and that consideration for objects is learned through this interaction. The "care" factor included various actions in which people treat an object carefully. In other words, "care" is an approach of consideration for objects by the person and "learn" means the awareness of learning that people gain from interaction with objects. It became clear that interaction with familiar objects includes not only polite and careful physical handling of an object, but also the entire process in which people learn respect for other people and the value of things through using these objects.

3.5. Discussion

In Study 1, we obtained descriptions of interaction with familiar objects from practitioners who handle objects and ordinary people who are not practitioners. The question items that evaluated this interaction were created from these bottom-up descriptions. Furthermore, another sample of participants identified one physical object that was familiar to them, and quantitatively evaluated their interaction with that object based on the developed question items. As a result of factor analysis, it was discovered that there are two apparent factors in people's interaction with familiar objects, namely, "care" and "learn." The first factor, "learn" reflects the awareness that one's mental functioning and physical movement are improved through interaction with objects. Humans seem to learn and grow by using familiar objects. The second factor, "care" reflects careful handling of objects. Overall, the element of "change in view" in the free description survey was consolidated into "learn," and "maintenance" and "treatment" were consolidated into "care."

It was not the purpose of this research to examine temporal precedence, but it is likely that the aspect of care will probably be satisfied first, followed by the aspect of learn. This is because "learn" here does not refer to general learning, but is limited to learning that can be obtained through interaction with objects. As human beings actively refine their manner of handling things, their ability to handle them is improved to some extent. After that, people may gain an awareness of what they are learning and realize the significance and value of the objects through their interaction. On the contrary, it seems partly misleading to think that one is improving mentally and physically through using an object, even though the person is not trained enough to deal with that object. The balance and relationship between "care" and "learn" has been discussed further in Studies 2 and 3.

4. Study 2

In Study 2, we examined the effect of the two factors of interaction with familiar things on the perceived connectedness to those things, using the scale developed in Study 1. It can be easily assumed that the strength of connectedness with a particular thing becomes stronger as the period of its usage becomes longer. In Study 2, to verify the effect of interaction with an object, we asked the period of use of the object and controlled it. Respondents were asked to rate their interaction with the object after identifying one object that they normally used at work.

When selecting a specific object, it is necessary to consider the influence of various attributes (price, function, etc.) of the object; however, it is difficult to consider all of these comprehensively. Instead, Study 2 confirms that care and learn are not some phenomena that occur only for a specific object, but are factors that represent individual differences in the interaction with general objects. In addition to care and learn for a specific object, respondents also answered questions regarding care and learn for general objects that are commonly found around them. It should be noted that care and learn for general objects would not exactly the same as PEB. As is clear from the question items shown in Table 2, care and learn clearly do not include specific PEBs, such as green shopping, waste separation, and recycling. The aspects of care and learn, even for general things, reflect aspects of interaction with familiar objects, and do not necessarily mean environment-friendly actions.

In this study, we examined the correlation of care and learn between the case of one specific object and the case of general objects, and examined whether the tendency of care and learn for a specific object is associated with these tendencies for general objects.

4.1. Method

4.1.1. Participants and Procedure

A total of 200 people with regular or non-regular employment participated (people who are employed for life are regular employees, while those who are employed for a fixed term are non-regular employees).

Respondents first identified one of the tools or objects they use most at work and wrote down what it was. They were instructed to select physical objects rather than software or programs. In addition, they reported the number of months that they had been using these objects. Next, they completed the scale for interaction with the identified object and perceived connectedness with it. Finally, they answered questions regarding interaction with the general tools and objects around them.

We excluded 5 of them from the analysis as they chose analytical software, etc. rather than physical objects when identifying the objects that they use at work. Thus, 195 participants were included in the survey (98 men, average age = 49.43 years, SD = 11.04, range = 30−69 years).

4.1.2. Measures

We used the scale developed in Study 1. The scale included 16 items and was evaluated on a 7-point rating scale. Respondents selected one of the things they often use in their work and then described their interaction with the specified thing. On the same scale, they also answered questions regarding interactions with tools and objects in general. As a result of exploratory factor analysis with promax rotation, the factor structure for a specific object as well as for general objects was completely consistent with that of Study 1, and we found the two factors of care and learn once again (see Supplementary Materials available online). Alpha reliability for a specific object was as follows: care = 0.92 and learn = 0.91, and for general objects was: care = 0.96 and learn = 0.95.

We used the Inclusion of Nature in Self scale of Schultz [49] to evaluate perceived connectedness with the object. To customize the scale for this study, we changed connectedness of "nature" and self-concept to connectedness of "the specified object" and self-concept. This is a graphical scale containing several pictures in a set of two circles placed side by

side. The degree to which two adjacent circles overlap depends on the question item. In Schultz [49], the degree of overlap is seven-step, and the picture with the smallest overlap is where the two circles are almost next to each other. However, considering the perceived connectedness of self-concept with physical things, it was likely that they would be perceived as perfectly independent in some cases. Therefore, we added one picture in which the two circles were completely separated (also available online). A total of eight pictures were presented (1 = two circles apart, 2 = two circles side by side, 3−8 = circles gradually increasing in the degree of overlap). Respondents were asked to choose the picture that best describes the relationship between themselves and their chosen objects.

4.2. Results

4.2.1. Selected Objects

The average period of usage of the items selected by the respondents was 172.52 months (SD = 143.34, range = 1−841). We classified the kind of objects that participants selected and found the following categories: Personal computers (N = 73); stationery (N = 43: pens, sharpeners, memos, etc.); tools (N = 15: drivers, spanners, etc.); household appliances (N = 12: pots, mops, etc.); medical equipment (N = 11: stethoscopes, thermometers, etc.); laboratory equipment (N = 10: pipettes, microscopes, etc.); electrical appliances (N = 9: digital cameras and communication devices, etc.); and vehicles (N = 9: bicycle, car, etc.). In addition, a category for "others" (N = 13) included hair care tools, pianos, sewing machines, boots, chairs, projectors, etc. Certainly, stationery items are used for a much shorter period, while pianos and cars may be used for several years. Although the period of use and the types of objects are diverse, the point of significance in this study is that they are all familiar objects for respondents.

4.2.2. Interaction with Objects and Connectedness

The average scores of the eight items included in the two factors of interaction with the object were calculated. The average score for care and learn was 5.11 (SD = 1.10, range = 2.25−7) and 3.96 (SD = 1.20, range = 1−7), respectively. The average perceived connectedness was 4.59 (SD = 1.99, range = 1−8). To examine the effects of care and learn, we classified participants into two groups, upper and lower 50%, based on their scores on the two factors. According to this classification, 64 people had high care and high learn, 50 people had high care and low learn, 38 people had low care and high learn, and 43 people had low care and low learn. The group variables of care and learn were used as independent variables.

Two-way ANCOVA was conducted to determine a statistically significant difference among the groups high and low in care and learn on perceived connectedness with the objects controlling for period of use. We found a significant effect of care on connectedness ($F(1, 190) = 3.91$, $p < 0.05$), and an interaction effect of care and learn on connectedness ($F(1,190) = 3.89$, $p = 0.05$). Regarding the main effect of care, the mean score of connectedness for the group high in care (M = 4.92, SD = 1.99) was higher than the group low in care (M = 4.24, SD = 1.94). Post hoc comparisons using the t-test with Bonferroni correction indicated that the mean score of connectedness for the group high in both care and learn (M = 5.17, SD = 2.09) was significantly higher than the group low in care and high in learn (M = 4.08, SD = 2.03) (Figure 1).

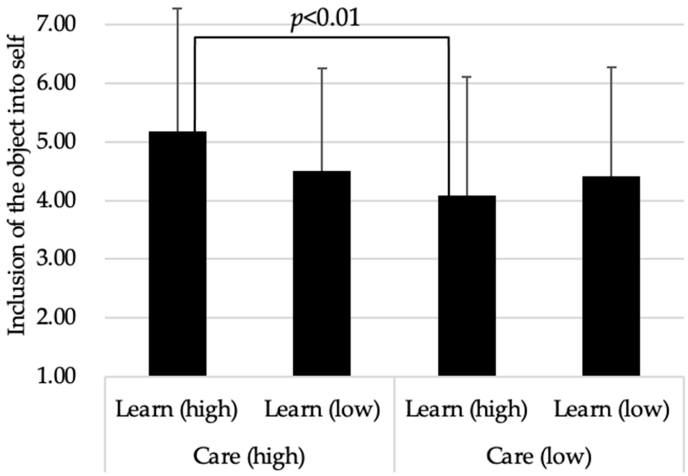

Figure 1. The post hoc comparisons using the t-test with Bonferroni correction showing the effect of care and learn for the objects on perceived connectedness with it.

4.2.3. Correlation between Care and Learn for the Identified Object and for General Objects

The average scores for the two factors of care and learn were calculated for the identified object as well as for general objects. Table 3 shows a significantly positive correlation between care for an identified object and care for general objects (r = 0.73), and between learn for an identified object and learn for general objects (r = 0.75).

Table 3. Correlation among the two factors.

	Learn for an Identified Object	**Care for General Objects**	**Learn for General Objects**
Care for an identified object	0.45 **	**0.73** **	0.49 **
Learn for an identified object		0.39 **	**0.75** **
Care for general objects			0.64 **

Note. ** $p < 0.01$.

4.3. Discussion

In Study 2, we examined how care and learn about a particular object affects the perceived connection to the object, controlling for period of usage. The results showed a main effect of care. This means that people with high care perceive a stronger connection to objects than those with low care. The results also showed an interaction effect between the two factors. This indicated that people with high levels of both care and learn feel more connected to things than those with low care and high learn. The first finding is that people not only feel a sense of unity with nature and the biosphere [20,23], but also with the objects around them. Despite the fact that the selection of objects varied in appearance and function, diligent interaction with them strengthened their association with the individual's self-concept. However, a strong sense of connectedness with objects may also facilitate care and learn. In the present study, we examined the impact of interaction on perceived connectedness, but it is important to consider that these relationships are still reciprocal. Regarding the objects chosen by the respondents, they included cars and pianos; these objects seem to be more difficult to handle than pens and calculators. Although the price of the objects and the amount of effort required to master them are not the focus of this study, there will be room for further investigation.

The other important result of Study 2 may be the balance of care and learn found in the interaction effect. It is not surprising that people who are high in both care and learn feel more connected to certain objects, but it should be noted that this is more so than those

who are high in learn while low in care. When people take good care of the objects and learn by using them, the connection between self-concept and objects is highly recognizable. However, if people neglect to care for objects but believe that they grow up through using them, the objects are perceived as distant from the self. Although it was expected that connectedness would be lowest when both care and learn were low, this was not the case. Whether this situation is just a coincidence, or whether some other factor is in play, cannot be determined by this study. This point should be investigated in future research.

Furthermore, it was confirmed that care and learn for specific objects are sufficiently reflected in the interaction with general objects. It is uncertain whether care for a particular thing or learning from it spreads to other things or vice versa. However, care and learn seem to show a general tendency for humans to interact with physical objects, rather than a behavioral tendency or consciousness that applies only to certain objects. Courteous interaction with objects may exist as an individual difference rather than a tendency to be influenced by the object. It is naturally conceivable that expensive items will be taken greater care of, whereas cheap items will be treated poorly, but a detailed examination of the attributes of different items needs to be further investigated in future studies to reach a conclusion regarding this point.

5. Study 3

Study 3 examined whether courteous interaction with objects affects PEB, which reflects a consideration for the wider natural environment, and well-being. In Study 2, we confirmed that the two factors, care and learn, can be regarded as individual differences in interactions with physical objects in general, rather than tendencies for interactions with specific objects. Therefore, in Study 3, respondents evaluated their interaction with general objects based on care and learn. Regarding PEB, this study aimed to explore the association among care, learn, and a wide variety of PEBs, rather than focusing on specific PEBs. We targeted various PEBs, such as recycling and power saving, and we investigated the impact of care and learn on each. In the analysis, we not only examined the effects of care and learn, but also controlled for gender, age, and the occupation. Finally, we clarified the relationship among courteous interaction with objects, PEB, and individual well-being. Here, we aimed to grasp the overall relationship rather than an analysis for each PEB.

5.1. Method

5.1.1. Participants and Procedure

A total of 600 people (300 men, average age = 49.37 years, SD = 11.28, range = 30−69) participated in the survey. Respondents completed scales evaluating interaction with general objects, PEB, and well-being. Respondents also provided their age and gender and their occupation or working status. For the occupation or working status, they selected one of the following categories: "company employee (general employee)," "company employee (manager)," "company manager (executive)," "civil servant/teacher/non-profit organization employee," "temporary/contract employee", "self-employed (commercial/industrial service)," " SOHO," "agriculture, forestry, fishery, and fishing," "professional (lawyer, tax accountant, medical-related)," "part-time job," "housewife/husband," "unemployed," and "other occupation".

5.1.2. Measures

We used the same scale as in Studies 1 and 2. Respondents answered questions regarding their interactions with physical objects in general. As a result of exploratory factor analysis with promax rotation, we found a factor structure that was completely consistent with that of Studies 1 and 2 (see Supplementary Materials available online). Alpha reliability for care and learn was 0.95 and 0.93, respectively. We computed average score for the two factors for analysis.

The scale used to measure PEB used items developed in a series of studies by Horike [50]. In addition to items evaluating PEB developed by Bechtel and Corral-

Verdugo [51], this scale includes 42 items that are likely to be performed daily as environment-friendly actions in Japan. Respondents answered on a 7-point scale (7 = Strongly agree, 6 = Agree, 5 = Slightly agree, 4 = Neither agree nor disagree, 3 = Slightly disagree, 2 = Disagree, 1 = Strongly disagree). Exploratory factor analysis of all items, using pro-max rotations, revealed that the Kaiser's criterion of eigenvalues greater than 1 yielded a seven-factor solution explaining 61% of the variance. The items and factors with alpha reliability are shown in Table 4. We used the average score for the seven factors in the following analysis.

Table 4. Measurement of PEB.

Factor (Alpha Reliability; Factor Contribution)	Items
General PEB (0.89; 6.99) Mean = 4.40 (SD = 1.28)	1. I try to live in an environmentally friendly manner. 2. I avoid spending that has a negative impact on the environment.
Social life (0.91; 10.90) Mean = 3.79 (SD = 1.10)	3. I talk to acquaintances and friends about environmental issues. 4. If I find someone engaging in a non-ecological act, I confront that person. 5. I read books and magazines that deal with environmental issues. 6. I buy organic cosmetics and vegetables, even if they cost a little more. 7. I encourage friends and family to recycle. 8. I try to avoid using automatic doors. 9. I try to buy foods that are locally produced and consumed and that are in season. 10. I always try to conserve resources. 11. I try to pick up trash when I find it on the street. 12. I buy products that use renewable packaging. 13. I try to take the stairs instead of the elevator. 14. I try to reduce the amount of garbage I produce at home.
Product selection (0.82; 10.63) Mean = 4.34 (SD = 1.16)	15. I try not to use synthetic detergents. 16. I consider the treatment of environmentally harmful substances, such as oil. 17. I use new paper as sparingly as possible. 18. I am interested in environmental protection products such as eco-cars and solar panels. 19. I try to buy refillable products as much as possible.
Power saving (0.83; 8.91) Mean = 4.73 (SD = 1.09)	20. I turn off the air conditioning and heating when I leave the room. 21. I turn off the lights in the room as much as possible and save electricity. 22. I turn off computers, monitors, and printers as often as possible. 23. I try to unplug electrical outlets as often as possible. 24. I do not leave water running in the tap. 25. I try to walk or ride a bicycle as much as possible. 26. I am practicing "Warm Biz" and "Cool Biz". (This means controlling the sensory temperature through clothing.) 27. I try to drive within the speed limit to save fuel.
Waste avoidance (0.84; 8.63) Mean = 5.15 (SD = 0.91)	28. I try not to leave leftovers. 29. I try to think if I can use it another way before I throw it away. 30. I try to use one thing for a long time. 31. I try to repair and use broken things as much as possible. 32. I try not to shop unnecessarily. 33. I practice proper separation of garbage. 34. I am careful to save water when washing dishes or taking a shower. 35. I save my laundry before putting it in the washing machine. 36. If I had the money, I would buy LED light bulbs (I have).
Disposal avoidance (0.86; 7.89) Mean = 4.60 (SD = 1.58)	37. I try not to use plastic bags as much as possible. 38. I always carry my own bottle. 39. I carry my own bag for shopping. 40. I use my own chopsticks and eco-bag.
Recycling (0.89; 6.65) Mean = 3.78 (SD = 1.53)	41. I try to recycle used clothes and furniture. 42. I use the recycling shop as much as possible.

To evaluate individual well-being, we used Diener et al. [52] Satisfaction with Life Scale that is widely used in psychology for measuring well-being. It includes the following five items: "In most ways my life is close to my ideal," "The conditions of my life are excellent," "I am satisfied with my life," "So far I have gotten the important things I want in life," and "If I could live my life over, I would change almost nothing," rated on a 7-point response scale (7 = Strongly agree, 6 = Agree, 5 = Slightly agree, 4 = Neither agree nor disagree, 3 = Slightly disagree, 2 = Disagree, 1 = Strongly disagree). Cronbach's coefficient alpha was 0.92 and the average score for all five items was used in this study.

5.2. Results

5.2.1. The Effect of Care and Learn on PEBs

As in Study 2, participants were divided into the top and bottom 50% based on the average score of care and learn. The average score for care and learn was 5.39 (SD = 1.03, range = 1−7) and 4.55 (SD = 1.13, range = 1−7), respectively. As a result, 231 people had high care and high learn, 73 people had high care and low learn, 87 people had low care and high learn, and 209 people had low care and low learn.

Two-way ANOVA was conducted to determine a statistically significant difference among the groups high and low in care and learn, respectively, on seven PEBs. The descriptive statistics are shown in Table 5 and the results of ANOVA are shown in Table 6. When the interaction effect was significant, post hoc comparisons using the *t*-test with Bonferroni correction were performed, and the differences obtained are shown in Figures 2–5. In addition, we examined the effects of care and learn after controlling for age, gender, and the occupation or working status. Two-way ANCOVA was conducted to determine a statistically significant difference among the groups high and low in care and learn, respectively, on seven PEBs controlling for age, gender and the occupation or woking status. Dummy variables for gender were set as follows: man = 1, woman = 2. Variables for the occupation or working status were set as follows: company employee (general employee) = 1, company employee (manager) = 2, company manager (executive) = 3, civil servant/teacher/non-profit organization employee = 4, temporary/contract employee = 5, self-employed (commercial/industrial service) = 6, SOHO = 7 agriculture, forestry, fishery, and fishing = 8, professional (lawyer, tax accountant, medical-related) = 9, part-time job = 10, housewife/husband = 11, unemployed = 12, other occupation = 13. The results of ANCOVA are shown in Table 7.

Table 5. Descriptive statistics.

Variables		Care		Learn		Total
		High	Low	High	Low	
General PEB	M	4.70	4.10	4.70	4.10	4.40
	SD	1.37	1.11	1.18	1.24	1.28
Social life	M	3.96	3.62	3.96	3.62	3.79
	SD	1.19	0.96	1.05	1.01	1.10
Product selection	M	4.56	4.12	4.56	4.12	4.34
	SD	1.29	0.97	1.13	1.09	1.16
Power saving	M	5.01	4.44	5.02	4.40	4.73
	SD	1.13	0.96	1.03	1.06	1.09
Waste avoidance	M	5.56	4.73	5.49	4.77	5.15
	SD	0.78	0.85	0.80	0.88	0.91
Disposal avoidance	M	4.86	4.32	4.91	4.24	4.60
	SD	1.71	1.37	1.51	1.58	1.58
Recycling	M	3.90	3.66	4.05	3.48	3.78
	SD	1.70	1.33	1.59	1.41	1.53

Table 6. Results of the two-way ANOVA.

	Predictors	*df*	Sum Sq	Mean Sq	*F*	*p*
General PEB	Care	1	7.11	7.11	4.91	0.03
	Learn	1	62.83	62.83	43.41	0.00
	Care*Learn	1	5.85	5.85	4.04	0.05
	Residuals	596	862.67	1.45		
Social life	Care	1	0.09	0.09	0.08	0.78
	Learn	1	63.76	63.76	60.62	0.00
	Care*Learn	1	13.71	13.71	13.04	0.00
	Residuals	596	626.96	1.05		
Product selection	Care	1	2.15	2.15	1.75	0.19
	Learn	1	46.27	46.27	37.72	0.00
	Care*Learn	1	5.44	5.44	4.43	0.04
	Residuals	596	731.15	1.23		
Power saving	Care	1	14.43	14.43	13.55	0.00
	Learn	1	24.66	24.66	23.17	0.00
	Care*Learn	1	0.60	0.60	0.56	0.46
	Residuals	596	634.48	1.07		
Waste avoidance	Care	1	45.14	45.14	72.11	0.00
	Learn	1	21.63	21.63	34.55	0.00
	Care*Learn	1	0.33	0.33	0.53	0.47
	Residuals	596	373.10	0.63		
Disposal avoidance	Care	1	8.40	8.40	3.56	0.06
	Learn	1	35.25	35.25	14.93	0.00
	Care*Learn	1	3.73	3.73	1.58	0.21
	Residuals	596	1407.25	2.36		
Recycling	Care	1	0.39	0.39	0.17	0.68
	Learn	1	42.79	42.79	18.94	0.00
	Care*Learn	1	8.75	8.75	3.87	0.05
	Residuals	596	1346.56	2.26		

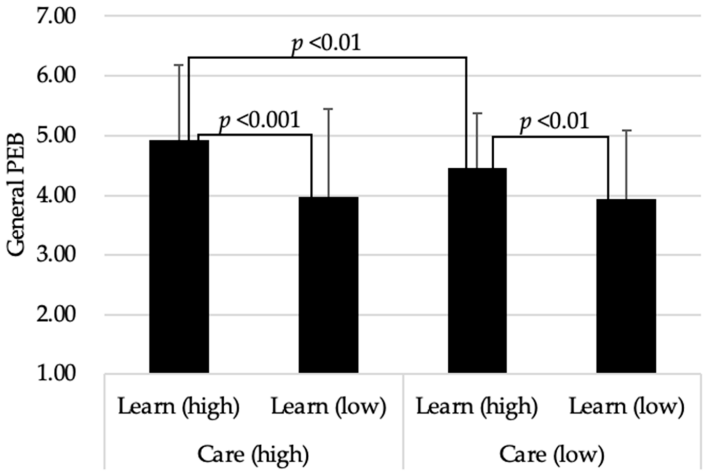

Figure 2. The post hoc comparisons using the *t*-test with Bonferroni correction showing the effect of care and learn for objects on general PEB.

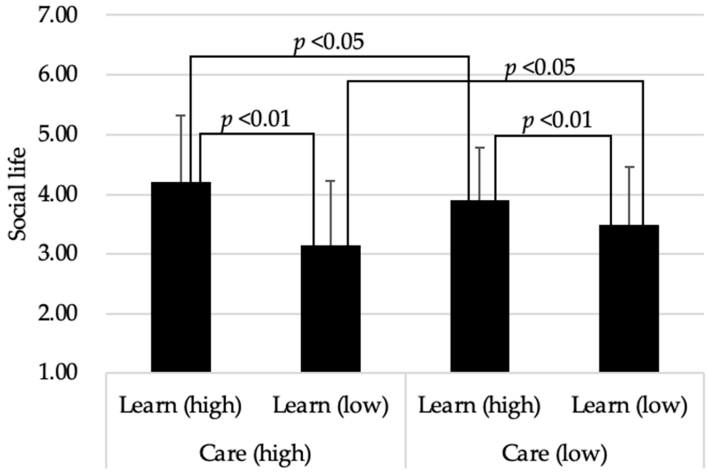

Figure 3. The post hoc comparisons using the *t*-test with Bonferroni correction showing the effect of care and learn for objects on social life.

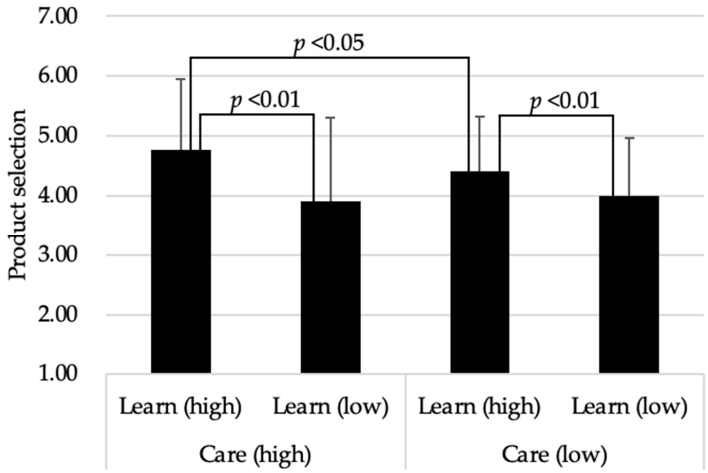

Figure 4. The post hoc comparisons using the *t*-test with Bonferroni correction showing the effect of care and learn for objects on product selection.

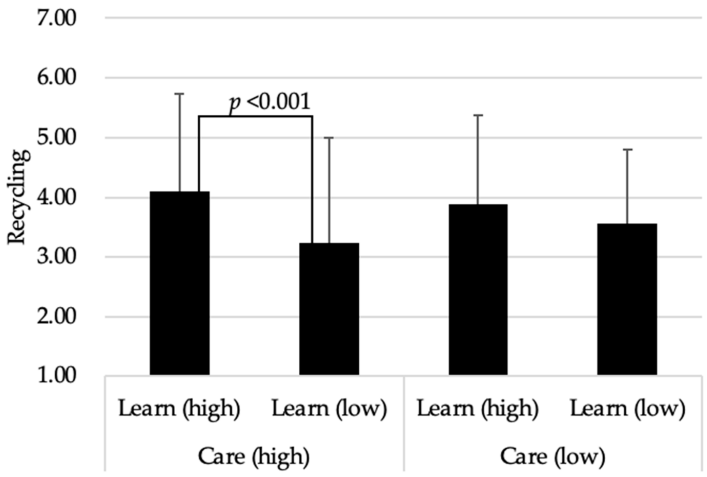

Figure 5. The post hoc comparisons using the *t*-test with Bonferroni correction showing the effect of care and learn for objects on recycling.

Table 7. Results of the two-way ANCOVA.

	Predictors	*df*	Sum Sq	Mean Sq	*F*	*p*
General PEB	age	1	29.24	29.24	21.27	0.00
	gender	1	10.03	10.03	7.30	0.01
	occupation or working status	1	0.59	0.59	0.43	0.51
	Care	1	7.15	7.15	5.21	0.02
	Learn	1	51.76	51.76	37.67	0.00
	Care*Learn	1	4.89	4.89	3.56	0.06
	Residuals	593	814.93	1.37		
Social life	age	1	25.99	25.99	26.00	0.00
	gender	1	8.95	8.95	8.96	0.00
	occupation orworking status	1	0.65	0.65	0.65	0.42
	Care	1	0.06	0.06	0.06	0.81
	Learn	1	52.91	52.91	52.92	0.00
	Care*Learn	1	12.54	12.54	12.54	0.00
	Residuals	593	592.90	1.00		
Product selection	age	1	19.32	19.32	16.96	0.00
	gender	1	31.39	31.39	27.55	0.00
	occupation orworking status	1	0.07	0.07	0.06	0.80
	Care	1	1.86	1.86	1.64	0.20
	Learn	1	39.14	39.14	34.35	0.00
	Care*Learn	1	5.04	5.04	4.42	0.04
	Residuals	593	675.67	1.14		
Power saving	age	1	14.85	14.85	14.78	0.00
	gender	1	20.83	20.83	20.73	0.00
	occupation orworking status	1	0.07	0.07	0.07	0.79
	Care	1	13.85	13.85	13.78	0.00
	Learn	1	20.15	20.15	20.05	0.00
	Care*Learn	1	0.48	0.48	0.47	0.49
	Residuals	593	595.87	1.01		
Waste avoidance	age	1	7.96	7.96	13.46	0.00
	gender	1	5.93	5.93	10.03	0.00
	occupation orworking status	1	1.65	1.65	2.79	0.10
	Care	1	44.39	44.39	75.07	0.00
	Learn	1	18.40	18.40	31.11	0.00
	Care*Learn	1	0.22	0.22	0.36	0.55
	Residuals	593	350.64	0.59		
Disposal avoidance	age	1	16.11	16.11	7.90	0.01
	gender	1	160.84	160.84	78.83	0.00
	occupation orworking status	1	0.94	0.94	0.46	0.50
	Care	1	6.22	6.22	3.05	0.08
	Learn	1	31.20	31.20	15.30	0.00
	Care*Learn	1	4.08	4.08	2.00	0.16
	Residuals	593	1209.84	2.04		
Recycling	age	1	0.72	0.72	0.32	0.57
	gender	1	8.95	8.95	3.99	0.05
	occupation orworking status	1	0.53	0.53	0.24	0.63
	Care	1	0.55	0.55	0.25	0.62
	Learn	1	41.40	41.40	18.44	0.00
	Care*Learn	1	8.74	8.74	3.89	0.05
	Residuals	593	1331.78	2.25		

As a result of ANOVA and ANCOVA, the main effect of learn was found to be significant for all PEBs (Tables 6 and 7). Those who learned more from their interactions with physical objects reported higher scores in all PEBs (Table 5). The main effects of care were also significant for "general PEB", "power saving", and "waste avoidance." Those who take better care of things reported higher scores on these behaviors.

Regarding the interaction effect, those with both high care and learn had higher general PEB than those with low care and high learn in ANOVA (Figure 2). It should be noted, however, that this interaction was not significant in ANCOVA. Similar differences were found in "social life" (Figure 3) and "product selection" (Figure 4). In "social life," there was a characteristic result that people with both low care and learn had higher level in social life than people with high care and low learn. In the case of "recycling," it was

shown that those with both high care and learn scored higher on recycling than those with high care and low learn (Figure 5).

5.2.2. The Relationship among Care, Learn, PEB, and Well-Being

To examine the effect of care and learn on PEB and well-being, we conducted an SEM (structural equation modeling) analysis. For PEB, the general PEB score that had a significant positive correlation with all other PEBs was used. Initially, we conducted CFA (confirmatory factor analysis) on care and learn, examining the 8-factor structure for each. The results of CFA determined that all items have factor weights greater than 0.45 and provide good estimates as following ($\chi^2(78) = 207.17$, $p < 0.001$, RMR = 0.06, AGFI = 0.93, CFI = 0.99, RMSEA = 0.05). Composite reliability was 0.91 for care and 0.95 for learn and average variance explained was 0.60 for care and 0.70 for learn. Then, paths were drawn based on the hypothesis that care and learn promote the general PEB, and that the general PEB promotes well-being. As in ANCOVA, in order to examine the effect of control variables, we drew paths from age, gender, and the occupation and working status to the general PEB, but the occupation and working status didn't show any significant paths, therefore, we deleted it. The modification indices showed that age and gender could relate to the other variables such as care, learn, and well-being, so the model was corrected accordingly. We also created an interaction variable that multiplied the standardized scores for care and learn and included it into the model, but we removed this variable because it was not significantly associated with the general PEB and other variables. This is similar to the result of ANCOVA that showed the interaction effect on the general PEB was not significant. The path from this interaction variable was significant in case of social life and product selection, where the interaction was significant in ANCOVA, and also in disposal avoidance (see Supplementary Materials available online).

The goodness of fit of the final model (Figure 6) was [$\chi^2(231) = 488.96$, $p < 0.001$, RMR = 0.16, AGFI = 0.91, CFI = 0.98, RMSEA = 0.04]. Standardized values are shown and the error term is not shown in Figure 6 and effects without p-value indicated are significant at the $p < 0.001$ level. As a result of SEM, it was found that the path from care to PEB was not significant but learn significantly improved the general PEB that finally had a positive impact on well-being. The results also showed that age had a positive association with care, learn, the general PEB and well-being, and at the same time, women had a higher level of the general PEB and well-being. The results other than the general PEB (available online) are generally similar, but the paths from power saving and waste avoidance to well-being are not significant. In other words, although learn promoted these PEBs, well-being was not enhanced by such PEBs. It is important to note that the results shown in Figure 6 are not representative of all PEBs.

5.3. Discussion

This study showed that courteous interaction with things had a positive effect on PEB in general. In particular, the effect of learn was seen in all PEBs. Awareness of learning through interaction with things may lead to more friendly behaviors toward the external natural world. However, waste avoidance may especially overlap with care in terms of actual behavior. The action to avoid waste is derived from environmental consideration and the care not to ruin things around us may be considered as similar phenomenon ultimately. We will carefully consider this point in the general discussion.

After examining the overall relationships, the impact of care and learn on (general) PEB became more apparent. Consistent with the ANOVA and ANCOVA results, learn, rather than care, seemed to promote PEB. Indeed, care is the factor of the courteous interactions but care alone may not influence PEB. Only after learning from the interaction with things, one may start thinking about the wider world and thinking about nature. Moreover, it was found that these relationships ultimately supported individual well-being. The result also showed that age and gender factors were associated with these relationships. We will discuss this further in the next section (Section 6).

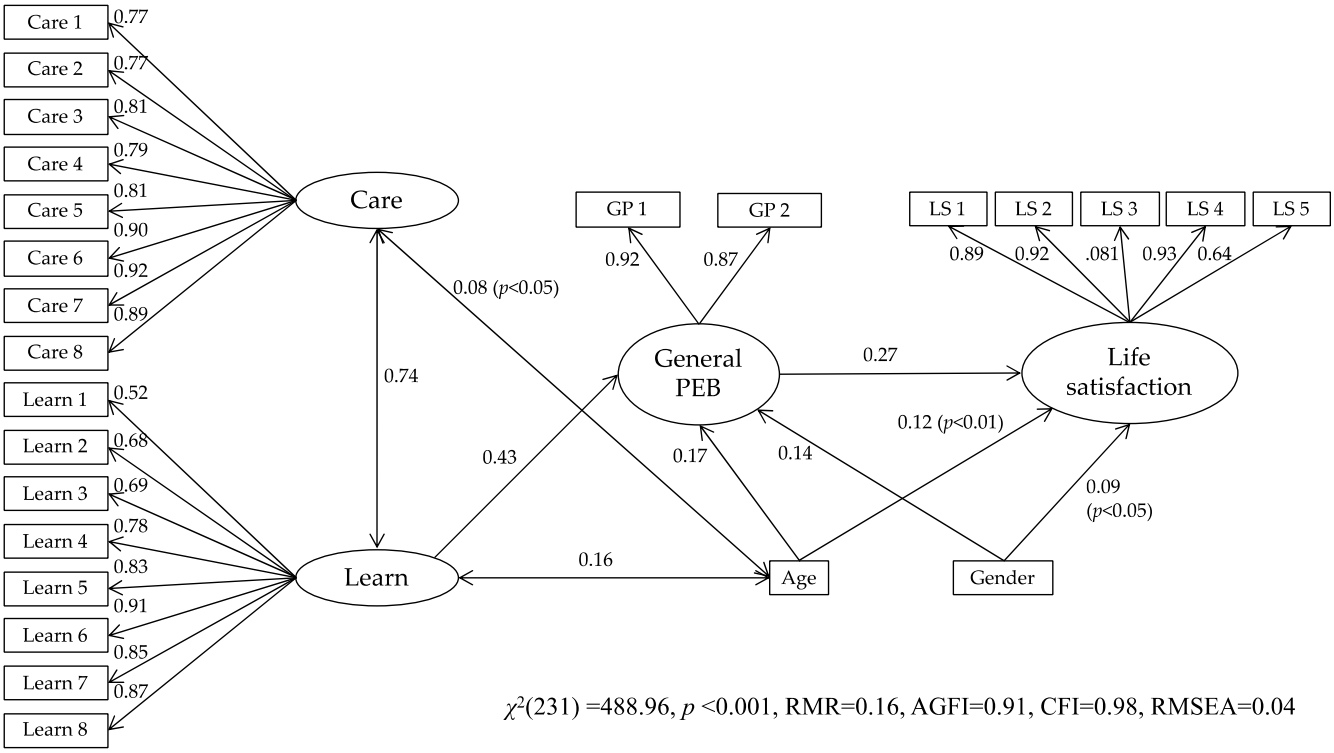

Figure 6. Relationships among care, learn, general PEB, and life satisfaction.

6. General Discussion

Through these three studies, we aimed to clarify the influence of courteous interaction with familiar physical objects on PEB and well-being. Previously, the relationship between PEB and education and values associated with nature has been examined [14,20,22–25]. A series of studies in this paper have shown that everyday interactions with familiar things, such as pens, books, etc. (which seem not directly associated with nature) are ultimately associated with PEB. Two factors of care and learn were found in the process of this interaction, and these factors were related to perceived connectedness to a thing, as well as to the general PEB and individual well-being.

As found by previous studies, PEB is affected by connectedness with nature [12,31]. We also found that connectedness with an object was perceived when people care for it and learn from interacting with it. The courteous interaction with the non-human object may involve a certain level of commitment to care and learn, which may have led to a sense of two-way connection between the object and the self. In the robot contest, it was pointed out that students lose track of time and become immersed in the interaction with objects [1,2]. This kind of proactive approach and a certain level of concentration may be behind care and learn. However, the effect of such aspects is still speculative in this study, and needs to be examined in the future. On the other hand, it seems natural that a high sense of connectedness with things promotes care and learn. It is reasonable to assume that both effects are present. The mechanisms of each impact will need to be examined.

It should be discussed that connectedness with objects is likely to be different from obsession or dependence on them. It has been argued that dependence on extrinsic objects is associated with psychological pathology [53] and excessive use of computer games is related to mental illness [54]. It is clear that these dependencies and addictions are psychologically harmful, and this may be because humans are psychologically overwhelmed by the irresistible influence of objects. In contrast, the connection brought about by courteous interaction with objects can be seen as a state of balanced influence between humans and non-humans. In addition, care and learn seem a self-directed attempt by the individual, not a loss of self-control as in dependency. Connecting with objects with such control

would promote a hybrid relationship between self and object and deepen familiarity with the object.

When care was low and learn was high, the perceived connectedness was the lowest. Care refers to the manner of handling objects; in this sense, it works in a direction from people to objects. Learn is a sort of discovery that may be experienced as coming from an interaction with objects. Although the temporal order of cultivation of care and learn was not considered in this paper, it is likely that people will start by actively caring for things and then acquire the learning aspect. If this is true, it is unreasonable to suppose that people recognize their development through interaction with things without caring for them. In this case, they would feel a contradiction implicitly, and the objects may be perceived as further away from them. However, a more detailed study focusing on the passage of time in this regard is needed.

In the analyses of ANOVA and ANCOVA in Study 3, the main effects of care on the general PEB, power saving, and waste avoidance were significant. Regarding care, we can also consider that the fact that people continue to use the objects around them carefully without wasting them seems similar to some aspects of PEB. Given that learn significantly affected all PEBs, the practice of taking sufficient care of objects to allow people to learn has potential to promote consideration for nature. In the analysis of SEM, it was also found that learn, which is associated with care, promotes PEB and consequently improves well-being. When understood comprehensively, the fact that the path from care to PEB was not significant means that careful handling of objects is not enough to fully create an awareness of the nature of the outside world. The result suggests that while there are two aspects in interaction with objects, the aspect of learn is important for people to broaden their perspective to the wider nature. However, these conceptual issues need to be further clarified in the future. Dissociation between attitudes toward PEB and actual behavior [55] and concerns about consistency of behavior [56,57] have also been pointed out. To further validate these, a sustainability perspective on care and learn is also needed.

Interactions with familiar objects were found to promote PEB and ultimately lead to well-being. There have been both positive and negative effects of PEB on well-being [33–35], but in this study, the effect was positive. Caring for and working with the objects and nature is still something that requires sacrifice. However, through repetition, one will become accustomed to it as a habit, and will feel the cost less. Alternatively, the learn that comes from taking good care of things and the feeling to do a morally good behaviors may have a positive psychological impact. If one can experience that caring for the outside world results in good outcomes for the individual, it may be not impossible to maintain courteous interaction and PEB.

It is quite possible that there are other ways of influencing care, learn, PEB, and wellbeing. In a practical sense, however, it is significant to focus on the accessible familiar objects. Many people (especially in developed countries) have the opportunity to interact with many objects every day. To practice courteous interaction with such objects may ultimately be beneficial to nature and the individual's mental state. This may require some kind of long spatio-temporal chain of events rather than an immediate effect. There is also room for consideration of other causal and adjustment variables that were not shown in this study.

In addition, although this study did not examine occupational differences in detail, it is necessary to examine in more detail the influence of work characteristics when interacting with objects. The types of objects used will differ depending on the occupation, and there will be a variety of characteristics in the way they interact with each other. This study also reveals little knowledge about the effects of the characteristics of objects, such as their prices and functions. The characteristics of occupations and objects need to be considered in the future. Moreover, the fact that these data have been obtained exclusively for the Japanese population is one of major limitations of this research. Cultural impact on PEB should be considered in the future. It has become clear that in Japan, a person considers oneself and the other as interdependent [58] and perceives a comprehensive context rather than

analytically capturing individual objects [59]. It seems that the Japanese are more likely to be involved in courteous interaction with objects, so further verification of this observation is required. It has been argued that human cognition and development is considered from a situational or sociocultural perspective, with the influence of interaction in local activities in line with internal mental processes [60]. It is emphasized that what and how people think is interdependent with their interactions in activities throughout their lives. It seems that growing up in an interdependent social culture has some impact on interaction with objects. On the other hand, a cultural mindset can be generated experimentally, and priming of a collective mindset strongly recognizes the association between objects [61]. Further understanding of cultural influences on the relationship between people and objects is needed. In addition, these studies is also limited by the representativeness of the samples. In all studies, online surveys were conducted by the survey company, so the participants are limited to those registered with that company and could have biases such as interest in these questions. Statistics from the Ministry of Internal Affairs and Communications in Japan [62] report that there are 6,088,000 (as of January 2021) people aged 25 and above in the workforce. We included hundreds of working people, 687 at most, but the sample sizes in our studies are extremely small. It is important to note that these findings are in great need of being reconfirmed. Finally, it is also noted that care and learn are not required for all objects. It is quite possible that people do not feel a sense of psychological connectedness with objects, but rather focus on their functions. Consumables that are not designed to be used repeatedly simply need to perform its function well, and people may not need a sense of connectedness. This point was not explored in this study, and the question of whether care and learn are necessary for any given object must be carefully considered.

Interactions with objects need further discussion because they are relevant to many social science disciplines. In the area of science, technology, and society, there have been the argument that technology develops autonomously to form society, and conversely, that human activities influence technology in various ways. In addition, it has been proposed to examine the process of social construction while considering the autonomous development of technology [63]. Latour [64] further transcends the premise of society as opposed to technology and points out that the self-concept is in a hybrid relationship with objects, arguing for the need to understand these as a transcendent network of cases rather than a completely divisible relationship. His theory emphasizes that humans and non-humans are inseparable entities and the process by which these actors are related to each other and to society. The two factors of interaction revealed in this study may be one possibility to suggest this process. Also, Mammen [65] points out that the world of objects has historical depth and is brought about by an uninterrupted trajectory as a particular object that exists spatiotemporally. In other words, for humans, objects have meanings that go beyond mere affordances and their distinctive qualities and utility. In this study, there was insufficient understanding of the concept of what a familiar object is. Deeper insights into the cyclical interaction between humans and non-humans need to be made in the future, along with empirical data.

In summary, this study originally revealed that interaction with familiar objects lead to PEB and ultimately improved well-being. The important finding of this research is that it clarified two aspects of interaction with familiar objects: care and learn. In the robot contests, it was discovered that people grow and develop by making things [2]. This research proposes the circulative relationship between objects and humans as improving each other. Verbeek [66] argued that the relationship between advanced technology and humans should be mutually penetrating in a desirable way. To better understand and develop a desirable relationship among objects, human beings, and nature, these associations need to be examined in further detail including the multiple issues mentioned above.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/su13073969/s1, a measurement of the Inclusion of Nature in Self scale used in Study 2, the results of a factor analysis of courteous interactions in Studies 2 and 3, and the results of SEM other than the general PEB.

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References

1. Mori, M.; Kamide, H. *Robotics and the Teaching of the Buddha*; Kosei-Shuppan: Tokyo, Japan, 2018. (In Japanese)
2. Mori, M. The meaning of the robot-contest for the human education. *J. Robot. Soc. Jpn.* **2009**, *27*, 694–966. (In Japanese)
3. Miceli, A.; Hagen, B.; Riccardi, M.P.; Sotti, F.; Settembre-Blundo, D. Thriving, Not Just Surviving in Changing Times: How Sustainability, Agility and Digitalization Intertwine with Organizational Resilience. *Sustainability* **2021**, *13*, 2052. [CrossRef]
4. Keeble, B.R. The Brundtland report: 'Our common future'. *Med. War* **1988**, *4*, 17–25. [CrossRef]
5. United Nations. Sustainable Development Goals. Transforming Our World: The 2030 Agenda for Sustainable Development. 2015. Available online: https://sustainabledevelopment.un.org/post2015/transformingourworld/publication (accessed on 24 February 2021).
6. Di Fabio, A.; Rosen, M.A. An Exploratory Study of a New Psychological Instrument for Evaluating Sustainability: The Sustainable Development Goals Psychological Inventory. *Sustainability* **2020**, *12*, 7617. [CrossRef]
7. Di Fabio, A.; Rosen, M.A. Opening the Black Box of Psychological Processes in the Science of Sustainable Development: A New Frontier. *Eur. J. Sustain. Dev. Res.* **2018**, *2*, 47. [CrossRef]
8. Di Fabio, A. Positive Healthy Organizations: Promoting Well-Being, Meaningfulness, and Sustainability in Organizations. *Front. Psychol.* **2017**, *8*, 1938. [CrossRef]
9. Di Fabio, A. The Psychology of Sustainability and Sustainable Development for Well-Being in Organizations. *Front. Psychol.* **2017**, *8*, 1534. [CrossRef]
10. United Nations about the Sustainable Development Goals 2018. 2018. Available online: https://www.un.org/ (accessed on 2 April 2020).
11. Schultz, P.W. Empathizing with nature: The effect of perspective taking on concern for environmental issues. *J. Soc. Issues* **2000**, *56*, 391–406. [CrossRef]
12. Schultz, P.W. The structure of environmental concern: Concern for self, other people, and the biosphere. *J. Environ. Psychol.* **2001**, *21*, 327–339. [CrossRef]
13. Schultz, P.W.; Shriver, C.; Tabanico, J.J.; Khazian, A.M. Implicit connections with nature. *J. Environ. Psychol.* **2004**, *24*, 31–42. [CrossRef]
14. Bruni, C.M.; Schultz, P.W. Implicit beliefs about self and nature: Evidence from an IAT game. *J Environ. Psychol.* **2010**, *30*, 95–102. [CrossRef]
15. Kollmuss, A.; Agyeman, J. Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environ. Educ. Res.* **2002**, *8*, 239–260. [CrossRef]
16. Jugert, P.; Greenaway, K.H.; Barth, M.; Büchner, R.; Eisentraut, S.; Fritsche, I. Collective efficacy increases pro-environmental intentions through increasing self-efficacy . *J. Environ. Psychol.* **2016**, *48*, 12–23. [CrossRef]
17. Tabernero, C.; Hernandez, B. Self-efficacy and intrinsic motivation guiding environmental behavior. *Environ. Behav.* **2011**, *43*, 658–675. [CrossRef]
18. Rahman, I.; Reynolds, D. Predicting green hotel behavioral intentions using a theory of environmental commitment and sacrifice for the environment. *Int. J. Hosp. Manag.* **2016**, *52*, 107–116. [CrossRef]
19. Arnocky, S.; Stroink, M.; De Cicco, T. Self-construal predicts environmental concern, cooperation, and conservation. *J. Environ. Psychol.* **2007**, *27*, 255–264. [CrossRef]
20. Hinds, J.; Sparks, P. Engaging with the natural environment: The role of affective connection and identity. *J. Environ. Psychol.* **2008**, *28*, 109–120. [CrossRef]

21. Frankel, S.; Sellmann-Risse, D.; Basten, M. Fourth graders' connectedness to nature—Does cultural background matter? *J. Environ. Psychol.* **2019**, *66*, 101347. [CrossRef]
22. Martin, L.; White, M.P.; Hunt, A.; Richardson, M.; Pahl, S.; Burt, J. Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours. *J. Environ. Psychol.* **2020**, *68*, 1–56. [CrossRef]
23. Chen-Hsuan Cheng, J.; Monroe, M.C. Connection to nature: Children's affective attitude toward nature. *Environ. Behav.* **2012**, *44*, 31–49. [CrossRef]
24. Grønhøj, A.; Thøgersen, J. Why young people do things for the environment: The role of parenting for adolescents' motivation to engage in pro-environmental behaviour. *J. Environ. Psychol.* **2017**, *54*, 11–19. [CrossRef]
25. Mobley, C.; Vagias, W.M.; DeWard, S.L. Exploring additional determinants of environmentally responsible behavior: The influence of environmental literature and environmental attitudes. *Environ. Behav.* **2010**, *42*, 420–447. [CrossRef]
26. Stern, P.C.; Dietz, T. The value basis of environmental concern. *J. Soc. Issues* **1994**, *50*, 65–84. [CrossRef]
27. Schwartz, S.H. Value orientations: Measurement, antecedents and consequences across nations. In *Measuring Attitudes Cross-Nationally: Lessons from the European Social Survey*; Jowell, R., Roberts, C., Fitzgerald, R., Eva, G., Eds.; Sage Publications, Ltd.: London, UK, 2007; pp. 169–203. [CrossRef]
28. Schutte, N.S.; Malouff, J.M. Mindfulness and connectedness to nature: A meta-analytic investigation. *Personal. Individ. Differ.* **2018**, *127*, 10–14. [CrossRef]
29. Tang, Y.; Geng, L.; Schultz, P.W.; Zhou, K.; Xiang, P. The effects of mindfulness on pro-environmental behavior: A self-expansion perspective. *Conscious. Cogn.* **2017**, *51*, 140–148. [CrossRef]
30. Aron, A.; Aron, E.N.; Smollan, D. Inclusion of other in the self scale and the structure of interpersonal closeness. *J. Personal. Soc. Psychol.* **1992**, *63*, 596–612. [CrossRef]
31. Martin, C.; Czellar, S. Where do biospheric values come from? A connectedness to nature perspective. *J. Environ. Psychol.* **2017**, *52*, 56–68. [CrossRef]
32. Dong, X.; Liu, S.; Li, H.; Yang, Z.; Liang, S.; Deng, N. Love of nature as a mediator between connectedness to nature and sustainable consumption behavior. *J. Clean. Prod.* **2020**, *242*. [CrossRef]
33. Carmi, N. Caring about tomorrow: Future orientation, environmental attitudes and behaviors. *Environ. Educ. Res.* **2012**, *19*, 430–444. [CrossRef]
34. Prati, G.; Albanesi, C.; Pietrantoni, L. Social Well-Being and Pro-Environmental Behavior: A Cross-Lagged Panel Design. *Hum. Ecol. Rev.* **2017**, *23*, 123–139. [CrossRef]
35. Brown, K.; Kasser, T. Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Soc. Indic. Res.* **2005**, *74*, 349–368. [CrossRef]
36. Stanley, L.R.; Lasonde, K.M.; Weiss, J. The relationship between environmental issue involvement and environmentally-conscious behavior: An exploratory study. *Adv. Consum. Res.* **1996**, *23*, 183–188.
37. Sudbury-Riley, L.; Kohlbacher, F. Ethically minded consumer behavior: Scale review, development, and validation. *J. Bus. Res.* **2016**, *69*, 2697–2710. [CrossRef]
38. Ojedokun, O. Development and Psychometric Evaluation of the Littering Prevention Behavior Scale. *Ecopsychology* **2016**, *8*, 138–152. [CrossRef]
39. Schultz, P.W.; Gouveia, V.V.; Cameron, L.D.; Tankha, G.; Schmuck, P.; Franěk, M. Values and their relationship to environmental concern and conservation behavior. *J. Cross-Cult. Psychol.* **2005**, *36*, 457–475. [CrossRef]
40. Armel, K.C.; Yan, K.; Todd, A.; Robinson, T.N. The Stanford Climate Change Behavior Survey (SCCBS): Assessing greenhouse gas emissions-related behaviors in individuals and populations. *Clim. Chang.* **2011**, *109*, 671–694. [CrossRef]
41. Maloney, M.P.; Ward, M.P. Ecology: Let's hear from the people: An objective scale for the measurement of ecological attitudes and knowledge. *Am. Psychol.* **1973**, *28*, 583–586. [CrossRef]
42. Maloney, M.P.; Ward, M.P.; Braucht, G.N. A revised scale for the measurement of ecological attitudes and knowledge. *Am. Psychol.* **1975**, *30*, 787–790. [CrossRef]
43. Tilikidou, I.; Adamson, I.; Sarmaniotis, C. The measurement instrument of ecologically conscious consumer behaviour. *MEDIT* **2002**, *1*, 46–53.
44. Larson, L.R.; Stedman, R.C.; Cooper, C.B.; Decker, D.J. Understanding the multi-dimensional structure of pro-environmental behavior. *J. Environ. Psychol.* **2015**, *43*, 112–124. [CrossRef]
45. Brick, C.; Sherman, D.K.; Kim, H.S. "Green to be seen" and "brown to keep down": Visibility moderates the effect of identity on pro-environmental behavior. *J. Environ. Psychol.* **2017**, *51*, 226–238. [CrossRef]
46. Casey, P.J.; Scott, K. Environmental concern and behaviour in an Australian sample within an ecocentric–anthropocentric framework. *Aust. J. Psychol.* **2006**, *58*, 57–67. [CrossRef]
47. Lee, T.H.; Jan, F.H.; Yang, C.C. Conceptualizing and measuring environmentally responsible behaviors from the perspective of community-based tourists. *Tour. Manag.* **2013**, *36*, 454–468. [CrossRef]
48. Lange, F.; Dewitte, S. Measuring pro-environmental behavior: Review and recommendations. *J. Environ. Psychol.* **2019**, *63*, 92–100. [CrossRef]
49. Schultz, P.W. Inclusion with nature: Understanding the psychology of human-nature interactions. In *Psychology of Sustainable Development*; Schmuck, P., Schultz, P.W., Eds.; Kluwer: New York, NY, USA, 2002; pp. 61–78.

50. Horike, K. *A Preliminarily Study for the Individual Differences in Sustainable Mind and Behavior. European Congress on Psychology*; University of Trieste: Trieste, Italy, 2012; p. 206.
51. Bechtel, R.B.; Corral-Verdugo, V. Happiness and Sustainable Behavior. In *Psychological Approaches to Sustainability*; Corral, V., García, C., Frías, M., Eds.; Nova Science Publishers: New York, NY, USA, 2010; pp. 433–450.
52. Diener, E.; Emmons, R.A.; Larsen, R.J.; Griffin, S. The Satisfaction with Life Scale. *J. Personal. Assess.* **1985**, *49*, 71–75. [CrossRef]
53. Graham, A.; Glickauf-Hughes, C. Object relations and addiction: The role of "transmuting externalizations". *J. Contemp. Psychother.* **1992**, *22*, 21–33. [CrossRef]
54. Weinstein, A. Computer and Video Game Addiction—A Comparison between Game Users and Non-Game Users. *Am. J. Drug Alcohol Abus.* **2010**, *36*, 268–276. [CrossRef] [PubMed]
55. Hargreaves, T. Practicing behaviour change: Applying social practice theory to proenvironmental behaviour change. *J. Consum. Cult.* **2011**, *11*, 79–99. [CrossRef]
56. Mazar, N.; Zhong, C.-B. Do green products make us better people? *Psychol. Sci.* **2010**, *21*, 494–498. [CrossRef] [PubMed]
57. Urban, J.; Bahnik, S.; Kohlová, M.B. Green consumption does not make people cheat: Three attempts to replicate moral licensing effect due to pro-environmental behavior. *J. Environ. Psychol.* **2019**, *63*, 139–147. [CrossRef]
58. Markus, H.R.; Kitayama, S. Culture and the self: Implications for cognition, emotion, and motivation. *Psychol. Rev.* **1991**, *98*, 224–253. [CrossRef]
59. Masuda, T.; Nisbett, R.E. Attending holistically versus analytically: Comparing the context sensitivity of Japanese and Americans. *J. Personal. Soc. Psychol.* **2001**, *81*, 922–934. [CrossRef] [PubMed]
60. Bang, M.; Culture, Learning, and Development and the Natural. World: The Influences of Situative Perspectives. *Educ. Psychol.* **2015**, *50*, 220–233. [CrossRef]
61. Mourey, J.A.; Oyserman, D.; Yoon, C. One without the other: Seeing relationships in everyday objects. *Psychol. Sci.* **2013**, *2*, 1615–1622. [CrossRef] [PubMed]
62. Available online: https://www.stat.go.jp/data/roudou/sokuhou/tsuki/index.html (accessed on 20 March 2021).
63. Winner, L. *The Whale and the Reactor*; University of Chicago Press: Chicago, IL, USA, 1986.
64. Latour, B. *We Have Never Been Modern*; Harvard University Press: Cambridge, MA, USA, 1993.
65. Mammen, J. *A New Logical Foundation for Psychology*; Springer: Cham, Switzerland, 2017.
66. Verbeek, P.-P. *Moralizing Technology: Understanding and Designing the Morality of Things*; University of Chicago Press: Chicago, IL, USA; London, UK, 2011.