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Research on the influence mechanism of environmental protection concept on consumption in the context of climate neutrality

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ABSTRACT

In the context of climate and neutrality, governments of many countries have introduced plastic restrictions. Enterprises often introduce pro-environmental services with certain force to the market. Does a good intention always have a good result? Despite good intentions, most pro-environmental services require extra effort (financial, physical, mental, etc.) from the participants. This will inevitably bring negative impact on some customers' repurchase intention. How to mitigate its negative consequences is worthy of academic attention. Previous studies show that sense of guilt motivates individuals to take prosocial actions to relieve or counteract temporary negative emotions. This paper analyzed and explained the affective mechanism of this phenomenon through two between-subject experiments. The results showed that: (1) High-autonomy effort (different from low-autonomy effort) can significantly release the sense of reactive guilt hence promote repurchase intention; (2) Low-autonomy effort (different from high-autonomy effort) will reduce people's perceived pleasure hence suppress repurchase intention; (3) Choice diversification can improve the perceived autonomy of individuals with low actual autonomy and compensate for the lack of actual autonomy, thus weakening the negative impact of low autonomous effort on perceived pleasure, and ultimately promoting people's repurchase intention.

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1. Introduction

In the context of climate and neutrality, governments of many countries have introduced plastic restrictions (Boros, 2019; Chu et al., 2022; Krämer, 2020). For instance, in 2020 Chinese government introduced plastic restrictions[1] to first-tier cities, and the catering industry was required to replace plastic straws with paper or PLA straws. Due to consideration of environmental responsibility or to meet the regulations and

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laws, more and more enterprises have added pro-environmental measures into service process. For example, large supermarkets replaced plastic shopping bags with canvas bags and paper bags. However, do consumers really want to cooperate? Some consumers comment that eco-friendly bags are far less convenient than plastic bags, and even claim that 'Before a cup of milk tea was finished, the paper straw has half melted', 'The taste of PLA straw makes me sick', 'If I have to use paper straws in future, I' d rather give up drinking milk tea'.

A good intention, not necessarily leads to good results. Environmentally friendly services often require consumers' cooperation, many of whom are in fact unwilling to pay the price. It would be unfair for enterprises to lose customers because they implemented greener measures, and it is not conducive for shaping a sustainable consumption oriented society if people are resistant due to once or twice unpleasant pro-environmental consumption experience. Therefore, how to guide consumers to cooperate with enterprises' pro-environmental measures and avoid causing negative emotions to them is a practical issue worth studying.

Pro-environmental services often require people to pay extra effort (such as time, money, energy, etc.) compared with ordinary consumption (Gibbs & Drolet, 2003; Howie et al., 2018), which is considered to be the crux of the avoidance behavior of some consumers (Gibbs & Drolet, 2003; Zhang et al., 2011). For example, the price of reusable bags are usually higher than plastic bags; Products made with environmentally friendly processes tend to set a higher price and demand a longer waiting time, and so on. In fact, as a kind of process behavior, the results of consumer effort can be both positive and negative (Mulier et al., 2021). Previous studies (Zhang et al., 2011) pointed out that in the process of goal pursuit, autonomous effort often leads to more positive follow-up motivation, while non-autonomous effort often leads to more negative follow-up motivation. The reason is that self-directed effort usually makes initial goal more valuable (attractive), while non-self-directed effort does the opposite (Higgins, 2000; Higgins & Scholer, 2009). It can be concluded that, making people feel more autonomous in their effort making should be the key to solving problems.

Temporary negative emotions can be relieved or offset after people taking remedial actions as a result of guilty feelings about their wrong actions or omissions (Escadas et al., 2019). That is, individuals make efforts to alleviate their own feelings of guilt and achieve 'redemption' of conscience (Dahl et al., 2005). This paper speculates that in the context of pro-environmental services, individuals with high autonomy (as distinct from those with low autonomy) tend to view their 'effort' as an 'act of kindness' rather than 'loss' and 'torture'. Such efforts help to repair people's feelings of guilt and achieve the goal of 'conscience redemption'.

Although there have been many studies on the consequences of consumer effort, the valence of effort outcome is still controversial (Cook et al., 2022; Higgins & Scholer, 2009). Although some scholars have provided explanations from the cognitive perspective (Zhang et al., 2011), however, the 'emotional black box' of consumers in this process has not been revealed. According to psychological literature, autonomous behavior usually bring positive emotions (Wertenbroch et al., 2020), while non-autonomous behavior usually trigger negative emotions such as perceived reactance (Brehm, 1966; Gill, 2020; Gong et al., 2021; Ryan & Powelson, 1991; Zwebner &

Schrift, 2020). However, Actual autonomy is often inconsistent with perceived autonomy (Brehm, 1966; Chen & Sengupta, 2014). More importantly, as a subjective concept, perceived autonomy can be easily manipulated (Brehm, 1966; Chen & Sengupta, 2014; Pittman, 2020). So here comes the question: Can the 'sense of loss' caused by low actual autonomy be compensated by the 'return' of perceived autonomy?

To sum up, this study hopes to verify the following three main issues through two experiments: First, high autonomous pro-environmental effort (different from low autonomous effort) can help alleviate reactive guilt, thus promoting people's positive repurchase intention; Second, low autonomous pro-environmental effort (different from high autonomous effort) reduces perceived pleasure and thus leads to negative repurchase intention. Third, choice diversification can 'compensate' for the lack of actual autonomy, thereby enhancing the mitigating effect of high autonomous effort on reactive guilt, weakening the negative effect of low autonomous effort on perceived pleasure, and ultimately promoting consumers' repurchase intention.

The contribution of this paper is as follows: First, it focuses on the pro-environmental service scenario with low actual autonomy that is more in line with the actual situation, rather than consumption scenario focused on in previous studies with many choices provided (Theotokis & Manganari, 2015), which has strong practical significance for promoting consumers' well-being and enterprise interests. Second, combining the bi-valence of effort outcome, this paper reveals the mediating role of affective mechanism between effort and repurchase intention. Third, previous studies tend to ignore the difference between actual and perceived autonomy. This paper proves that the improvement of perceived autonomy can compensate for the lack of actual autonomy. This finding helps marketers optimize the design of service processes.

2. Theoretical basis and research hypothesis

2.1. Consumer effort

Consumer effort is usually defined as material, mental and financial resources that consumers expend to achieve their goals. Most of the literature defines effort as an additional cost over and above the monetary cost (Gibbs & Drolet, 2003). In this study, consumer perceived effort is defined as people's subjective consumption in four dimensions: time cost, economic cost, perceived convenience and perceived difficulty.

Previous studies have focused on the consequences of effort rather than the antecedents (Howie et al., 2018; Mulier et al., 2021; Zhang et al., 2011), and have been controversial in valence (Mulier et al., 2021). In terms of positive effects. When people are aware that a review comes from a mobile device, they speculate it requires more physical effort to create and equate the greater perceived effort with the credibility of the review (Grewal & Stephen, 2019). Consumer effort in information processing is also believed to contribute to the persuasiveness of advertising messages (Baek & Yoon, 2017). In terms of negative effects, surface behavior will increase consumers' perception of effort and reduce their perception of value (Cook et al., 2022). Viewing video ads on a vertically placed phone is more effective for participants to process

information than on a horizontally placed phone because it requires less effort (Mulier et al., 2021). Although many scholars have studied this phenomenon, there are many contradictions in the existing research conclusions. As a potential answer to this paradox, Zhang et al's study (2011) have discussed the bi-valence of effort consequences by dividing it into autonomous and non-autonomous scenarios, and consider that actual autonomy is the criterion for judging the valence of effort consequences. However, evidence shows that perceived autonomy is different from actual autonomy and can be measured and represented by multiple levels and dimensions (Chen & Sengupta, 2014; Theotokis & Manganari, 2015). Moreover, consumers' perception and subsequent behavior are usually determined by perceived autonomy (Gill, 2020; Pittman, 2020). Therefore, this paper argues that it is valuable to analyze the consequences of effort from the perspective of perceived autonomy rather than actual autonomy.

2.2. Sense of guilt and prosocial-environmental consumption

Guilt is a negative emotional state that people experience when they perceive their actions or inactions to be inconsistent with their intentions (Duhachek et al., 2012). When this happens after people violate personal moral or social standards, it is called reactive guilt; If it occurs before a decision, it is called anticipated guilt (Berndsen et al., 2004; Duke & Amir, 2019). Feelings of guilt motivate individuals to take prosocial actions to mend, repair, or remedy damaged relationships (Estrada-Hollenbeck & Heatherton, 1998), in order to relieve or counteract temporary negative emotions (Baumeister et al., 1994; Carlson & Miller, 1987; Cialdini et al., 1973), even if only considering the potential negative consequences caused to others (Chen & Sengupta, 2014; Pittman, 2020). The purpose is to relieve or counteract temporary negative emotions (Baek & Yoon, 2017; Coleman et al., 2020). For example, to alleviate guilt towards the salesperson for lack of purchase, people may take remedial action in future purchase (Fan et al., 2021). This paper argues that in pro-environmental consumption, individuals with high autonomy tend to regard their 'effort' as a 'good act', while individuals with low autonomy tend to regard effort as 'loss' and 'torture'. Then hypothesis 1 was proposed:

H1: When individuals have higher autonomy (instead of lower autonomy), pro-environmental effort significantly reduces perception of reactive guilt.

Guilt-free appeal is a marketing strategy that promotes purchases and consumption by alleviating consumers' expected guilt (Haynes & Podobsky, 2016; Lindenmeier et al., 2017). It is often referred to as 'indulgence consumption' (Haynes & Podobsky, 2016) and 'vice consumption' (e.g. unhealthy food and luxury goods) (Chen & Sengupta, 2014; Elder & Mohr, 2020; Yi & Baumgartner, 2004). This paper argues that, like the principles of guilt-free appeal strategies, pro-environmental efforts can help reduce reactive guilt and thus promote people' repurchase intentions. Then hypothesis 2 and hypothesis 3 are put forward:

H2: The mitigation of reactive guilt significantly promotes repurchase intention.

H3: When individuals have higher autonomy (instead of lower autonomy), reactive guilt mediates the relationship between pro-environmental effort and repurchase intention. Specifically speaking, as the level of perceived effort increases, the level of reactive guilt decreases, thus promoting people's repurchase intention.

2.3. Consumer effort and emotional perception

Psychological literature points out that efforts that deviate from the initial motivation tend to trigger negative emotions in consumers (Kugler & Jones, 1992). After referring to the research of Appraisal theory (Roseman, 1996; Russell & Mehrabian, 1974; Weiner & Graham, 1989), this paper argues that the happiness people feel in consumption activities is closer to relatively mild and short-term forms of happiness (such as pleasure and satisfaction), that is, the combination of pleasure and low arousal. Therefore, our research decided to incorporate perceived pleasure as an affective variable into the model to measure and explain the negative emotions caused by low autonomous pro-environmental effort. Accordingly, hypothesis 3 is proposed:

H4: When individuals have lower autonomy (instead of higher autonomy), pro-environmental effort negatively affects perceived pleasure.

The consequences of positive emotions are usually positive. For example, happy experience of consumption (Mano & Oliver, 1993) and positive evaluation (Forgas & Ciarrochi, 2001) are usually associated with post-consumption satisfaction. The consequences of negative emotions are often negative. For example, negative emotions mediate the relationship between consumer perceptions of irresponsible corporate behavior and negative reactions to the company (negative word of mouth, complaints, and boycotts) (Xie & Bagozzi, 2019). For another example, the negative emotions induced by out-of-stock will reduce customers' perception of store image and decision-making satisfaction (Kim & Lennon, 2011). Based on this, hypothesis 4 and hypothesis 5 are proposed in this paper:

H5: A decrease in perceived pleasure significantly inhibits repurchase intention.

H6: When individuals have lower autonomy (instead of higher autonomy), perceived pleasure mediates the relationship between pro-environmental effort and repurchase intention. Specifically speaking, as the level of effort increases, the level of perceived pleasure decreases, thus inhibiting people's repurchase intention.

2.4. Sense of control compensation and self-attribution

Autonomy is the belief that a person is free to choose how to act in a given situation (Deci & Ryan, 1985; Wertenbroch et al., 2020). Similar concepts are sense of control and sense of power (Rucker & Galinsky, 2008). In contrast to autonomy, the other two emphasize control over resources, environment, and outcomes (Averill,1973; Hui & Bateson, 1991; Keltner et al., 2003). When there is no sense of control or power, people feel psychological resistance (Brehm, 1966) and pressure (Averill,1973), because they feel the threat to their freedom, therefore they will seek compensation in some way (Gabisch & Milne, 2014; Howie et al., 2018; Keltner et al., 2003). These

strategies need not necessarily target the direct source of the loss. For example, monetary incentives can lower consumers' expectations of privacy protection (Gabisch & Milne, 2014). Increasing choice diversity has been laterally demonstrated to enhance perceived autonomy (Chen & Sengupta, 2014; Howie et al., 2018). Therefore, this paper hypothesizes that under the scenario of low actual autonomy, consumers' perceived autonomy can be improved by increasing the choice diversity in pro-environmental services, thus compensating for the sense of loss caused by low actual autonomy.

A large body of evidence suggests that the greater the perceived autonomy, the more individuals tend to associate the consequences of an event with themselves rather than with others (Antonetti & Maklan, 2014). For example, respondents report that injuries to pedestrians are more allowed when caused by self-driving cars than when themselves acted as decision agents (Gill, 2020). The shift in attribution of responsibility is thought to be responsible for the shift in moral judgments. It can be easily concluded that, attributions of negative results often make people face moral judgment, while attributions of positive results often make people feel the salvation of the soul. In pro-environmental consumption, a variety of options (as opposed to sole option) helps consumers attribute their pro-environmental contribution to their own efforts, and this positive self-attribution contributes to a further decrease in reactive guilt perception. Then hypothesis 7a is put forward:

H7a: The mitigating effect of highly autonomous pro-environmental effort on reactive guilt is enhanced with increasing choice diversity.

Previous literature points out that, an increase in consumers' perceived autonomy will be accompanied by a decrease in their perceived effort (Cook et al., 2022). Moreover, enhanced control (e.g. optimization of environmental conditions) helps to promote people's perception of positive emotions (Hui & Bateson, 1991) and willingness to participate in prosocial activities (Howie et al., 2018). Based on this, this paper speculates that the negative emotions and negative consequences brought by low actual autonomy are improved as autonomy is 'returned'. Thus hypothesis 7 b is put forward:

H7b: The reduction of perceived pleasure due to low autonomous pro-environmental effort is attenuated with increasing choice diversity.

To sum up, the conceptual model of this study is proposed, as shown in Figure 1:

3. Research methods

There are two experiments in this study. Experiment 1 is a 2 (perceived effort level: high vs. low) × 2 (autonomy level: high vs. low) between-subject experimental design to test hypotheses H1-H6, namely, the mediating role of reactive guilt and perceived pleasure as affective variables between consumer effort and repurchase intention. Experiment 2 is a 2 (actual autonomy level: high vs. low) ×2 (perceived effort level: high vs. Low) ×2 (choice of diversity level: high vs. low) field experiment for data collection. The purpose is to retest H1-H6 and further test the moderating effect of H7a and H7b.

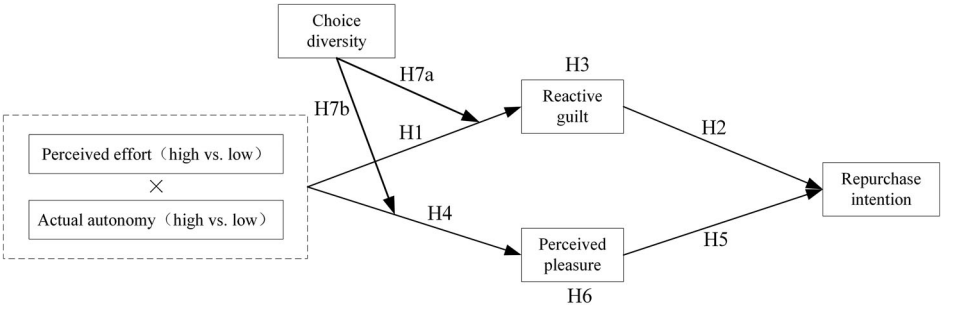

Figure 1. Model concept diagram.
Source: created by the research team.

3.1. Study 1: the effect of effort on subsequent behavior and its emotional mediating mechanism

In experiment 1, a total of 424 subjects (78 males, with an average age of 21 years) were recruited and data were collected from an experiment under imaginary scenario. The experimental materials were degradable shopping bags (high effort group) and plastic shopping bags (low effort group). The manipulation of autonomy is based on previous studies, and the criterion of autonomy is whether consumers can make their decision of action or inaction freely (Zhang et al., 2011). After removing invalid subjects with incomplete filling, 397 valid samples were retained.

In the first step, the researchers asked participants to imagine they were ordering food from a online food delivery platform and showed them a simulated payment interface. In the second step, at the time of payment, the designed system provided the group of high autonomy with two options as 'Disposable tableware needed' and 'No disposable tableware needed'. Since using self-provided tableware often requires more effort (e.g. it needs cleaning before and after use). Participants who actively chose 'No disposable tableware' were categorized in high-effort group ($N_{\text{high autonomy \_ high effort}}=96$). Participants who actively chose 'Disposable tableware needed' were classified as the low-effort group ($N_{\text{high autonomy \_ low effort}}=100$). In the group of low autonomy, participants were randomly informed that 'Disposable tableware are provided' ($N_{\text{low autonomy \_ low effort}}=112$) or 'No disposable tableware are provided' ($N_{\text{low autonomy \_ high effort}}=89$). Finally, participants were invited to answer scales of reactive guilt, perceived pleasure, repurchase intention, and manipulation tests. They also filled out demographic questionnaires, including how often they purchased groceries, their monthly expenditures, and demographic information. These variables were included as covariates in data analysis. Because individual's own pro-environmental intention is considered to be one of the main determinants of pro-environmental consumption behavior (Vaughn, 1980). This paper also tested subjects' attitudes and concerns about environmental issues, and included them as covariates in the statistical analysis.

3.1.1. Preliminary experiment

In order to perform manipulative tests for the stimulus of 'perceived effort' in the experiment, experiment 1 took a preliminary experiment. A total of 100

undergraduates (36 males, with an average age of 24) from a university in Southwest China were recruited. The experimenter asked the subjects to imagine that they were ordering food on a online food delivery platform, and randomly divided the subjects into two groups with 50 people each. The participants were then asked to rate their perceived effort under the condition of 'using disposable tableware' and 'using self-prepared tableware'. individually. After data cleaning, 98 valid samples were obtained. The pre-experiment results showed that manipulation towards perceived effort ($M_{\text{low effort level}}$=2.833, $M_{\text{high effort level}}$=4.020, t(96)=-4.735, $p < 0.010$) was significant. Therefore, the stimulus materials in pre-experiment were used in the formal experiment.

3.1.2. Variable measurement

Variables were measured using 7-level Likert scales (1 means 'totally disagree' and 7 means 'totally agree'). All scales in this study referred to extant mature scales. The reactive guilt scale (Cronbach's $\alpha = 0.964$) referred to the research of Duhachek et al. (2012). The perceived effort scale (Cronbach's $\alpha = 0.983$) was contextually adjusted according to Morales' research, including three questions, 'I think the amount of effort required for me to finish this task is'. , 'The cost for this task to me is'. , 'I think the input I need for this task is'. 1 means very little, and 7 means very much (Morales, 2005). The scale of repurchase intention (Cronbach's $\alpha = 0.951$) referred to the study of Bian and Forsythe (2012). The measurement of perceived pleasure (Cronbach's $\alpha = 0.885$) was based on the study of Ki et al. (2017). Previous literature has developed a large number of scales to assess consumers' pro-environmental intentions (Kinnear et al., 1974; Zimmer et al., 1994). Through comparison, this study finally selected the following three questions: 'Human beings are seriously damaging the environment', 'Our industrialized society cannot go beyond the limits of growth', and 'In order to survive, human beings must live in harmony with nature'.

3.1.3. Data analysis

1. Maneuverability Test
   There were significant differences in perceived effort level ($M_{\text{low effort level}}$=2.385, $M_{\text{high effort level}}$=4.776, t(395)=-39.641, $p < 0.010$), indicating successful manipulation of perceived effort. There was no significant difference in pro-environmental intention ($M_{\text{low autonomy}}$=4.513, $M_{\text{high autonomy}}$=4.524, t(395)=-0.165, $p = 0.869 > 0.050$), indicating that the participants' original pro-environmental intention had no significant impact on the results of experiment 1. The results of Harman's single factor test showed that the variance explained by the first principal component accounted for 24.508% of the total cumulative variance, which was lower than 40%, proving that there was no serious common method bias problem in the data.
2. Hypothesis Test
   In the group of high autonomy, the level of reactive guilt decreased significantly with the increase of perceived effort (β=-1.070, F(1,183)=216.042, t=-20.546, $p < 0.010$), thus H1 was supported. With the reduction of reactive guilt,

repurchase intention showed an upward trend (β=-0.751, F(1,183)=205.303, t=-19.950, $p < 0.010$), thus H2 is supported. The mediating effect of reactive guilt was significant (β = 0.592, LLCI = 0.425, ULCI = 0.761). After controlling for each mediation path, the direct path is still significant (β = 0.300, LLCI = 0.133, ULCI = 0.380), so it is a partial mediation effect with a contribution rate of 66.368%, hence H3 is supported.

In the group of low autonomy, with the improvement of perceived effort level, individual's perceived pleasure level decreased significantly (β=-0.959, F(1,210)=120.185, t=-15.450, $p < 0.010$), thus H4 is supported. With the increase of perceived pleasure, repurchase intention increased significantly (β = 0.402, F(1,210)=27.883, t = 7.017, $p < 0.010$), thus H5 is supported. The mediating effect of perceived pleasure was significant (β=-0.213, LLCI=-0.290, ULCI=-0.142). After controlling each mediation path, the direct path is no longer significant (β=-0.123, LLCI=-0.286, ULCI = 0.039), so it is a complete mediation, and H6 is supported.

In the group of high autonomy, perceived effort had no negative effect on perceived pleasure, but a significant positive effect (β = 0.223, F(1,183)=14.917, t = 13.774, $p < 0.010$). The positive effect of perceived pleasure on repurchase intention was marginally significant (β = 0.207, F(1,183)=4.137, t = 2.034, $p = 0.043 < 0.050$), and the mediating effect of perceived pleasure between perceived effort and repurchase intention was not significant (β=-0.016, LLCI=-0.054, ULCI = 0.013). This indicates that perceived pleasure cannot effectively explain the mechanism of high autonomous effort on repurchase intention.

In the group of low autonomy, the mitigation effect of perceived effort on reactive guilt was not significant (β = 0.041, F(1,210)=1.967, t = 1.402, $p = 0.162 > 0.050$). The effect of reactive guilt on repurchase intention was not significant (β = 0.049, F(1,210)=0.061, t = 0.247, $p = 0.805 > 0.050$). The mediating effect of reactive guilt between perceived effort and repurchase intention was also not significant (β=-0.009, LLCI=-0.040, ULCI = 0.020). It indicates that reactive guilt could not effectively explain the mechanism of low autonomous effort on repurchase intention.

In comparison, in the group of high autonomy, perceived effort level had a significant positive effect on repurchase intention ($\beta_{\text{high autonomy}}$=0.873, F(1,183)=268.102, t = 4.435, $p < 0.010$). In the group of low autonomy, perceived effort level had a significant negative effect on repurchase intention ($\beta_{\text{low autonomy}}$=-0.699, F(1,183)=101.819, t = 27.303, $p < 0.010$). This result is consistent with the conclusions of previous studies (e.g. Zhang et al., 2011). In contrast, perceived effort in the group of high autonomy had a more significant mitigation effect on reactive guilt ($\beta_{\text{high autonomy}}$=-1.070, $p < 0.010$; $\beta_{\text{low autonomy}}$=-0.041, $p = 0.162 > 0.050$); The perceived effort in the group of low autonomy had a more significantly negative effect on perceived pleasure ($\beta_{\text{high autonomy}}$=0.223, $p < 0.010$; $\beta_{\text{low autonomy}}$=-0.959, $p < 0.010$).

The experimental results are shown in Figures 2 and 3.

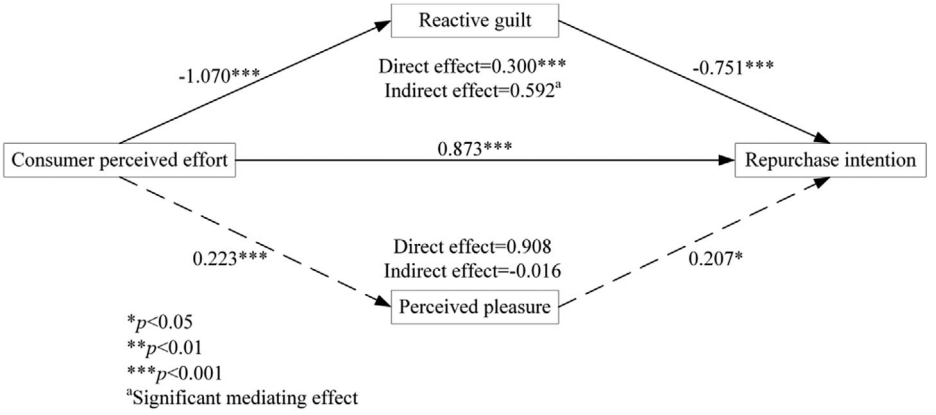

Figure 2. Path test results (high autonomy group).
Source: created by the research team.

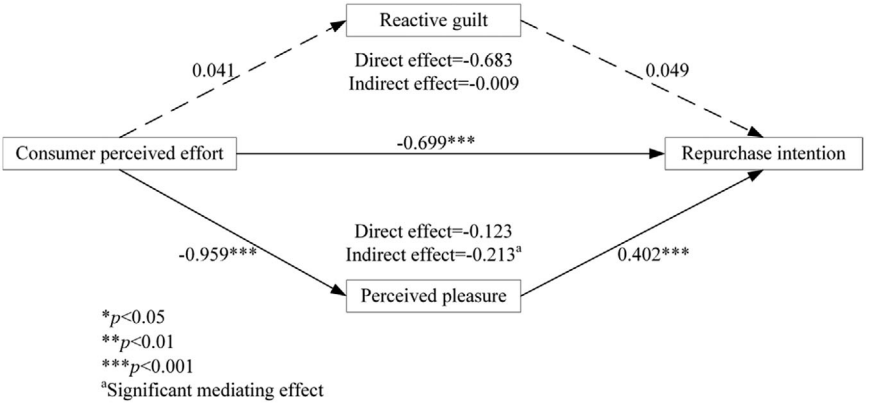

Figure 3. Path test results (low autonomy group).
Source: created by the research team.

3.1.4. Results and discussion

First, for subjects with high autonomy, reactive guilt levels decreased significantly as perceived effort levels rose, leading to more positive subsequent outcomes. Reactive guilt plays a partial mediating role. Second, for subjects with low autonomy, perceived pleasure level decreased significantly as perceived effort levels increased, subsequently eliciting more negative subsequent outcomes. Perceived pleasure acts as a complete mediator in this process. Third, in comparison, pro-environmental effort in the group of high autonomy has a more significant mitigation effect on reactive guilt; pro-environmental effort had a more significant negative effect on perceived pleasure in the group of low autonomy. Thus, reactive guilt was better able to explain the affective mechanism in the group of high autonomy, whereas perceived pleasure was better able to explain the affective mechanism in the group of low autonomy. Finally, pro-environmental effort in the group of high autonomy had a significant promoting effect on perceived pleasure, which is consistent with previous findings that autonomous effort tends to lead to more positive emotions (Wertenbroch et al., 2020).

Although experiment 1 proved that there are differences in the results of the impact of effort on repurchase intention under different levels of autonomy. However, the actual autonomy and perceived autonomy have not been effectively distinguished and compared in experiment 1. On the basis of experiment 1, experiment 2 further examined the 'compensation effect' of the improvement of perceived autonomy on the lack of actual autonomy.

3.2. Study 2: triple interaction of actual autonomy, perceived effort, and perceived autonomy on subsequent behavior

Experiment 2 was a field experiment conducted in a beverage shop self-operated by the hotel department of a university. The test materials were degradable straws (high effort group) and plastic straws (low effort group). The beverage store agreed to work with our researchers for eight days. A total of 630 students and teachers (137 men, mean age 25) participated in the study. This beverage store is a new store that has just started, so the influence of brand familiarity and brand impression on consumer perception can be excluded. Experiment 2 followed the manipulation of experiment 1 on the variable of actual autonomy and manipulated perceived autonomy with choice diversity. A total of 624 valid samples (131 males, average age 26 years) were obtained after eliminating repeated subjects and incomplete questionnaires.

During the experiment, the beverage store was under operation, and during four days of high actual autonomy (the first four days), participants were provided the choices between degradable and plastic straws. During the four days of low actual autonomy (the last four days), subjects were randomly provided with either a degradable straw or a plastic straw. On the four days with high choice diversity (even-numbered days), the beverage store provided the subjects with straws of three different colors ($N_{\text{high choice diversity \_ high actual autonomy \_ high effort}}=80$; $N_{\text{high choice diversity \_ high actual autonomy \_ low effort}}=74$; $N_{\text{high choice diversity \_ low actual autonomy \_ high effort}}=83$; $N_{\text{high choice diversity \_ low actual autonomy \_ low effort}}=79$) . On four days of low choice diversity (odd-numbered days), the beverage store provided the subjects with straws of a sole color ($N_{\text{low choice diversity \_ high actual autonomy \_ high effort}}=80$; $N_{\text{low choice diversity \_ high actual autonomy \_ low effort}}=75$; $N_{\text{low choice diversity \_ low actual autonomy \_ high effort}}=80$; $N_{\text{low choice diversity \_ low actual autonomy \_ low effort}}=73$). In fact, different-colored degradable straws are made from the same degradable material. For the purpose of the experiment, the researchers deliberately color-coded them and said they were made from three different anonymous degradable materials. The three plastic straws, also made from the same plastic material, were deliberately color-coded for experimental purposes and said to be made from three different plastic materials. When the customers finished drinking and were about to leave, the experimenter recorded the group of subjects and invited them to fill out scales measuring perceived autonomy, reactive guilt, perceived pleasure and perceived effort, and eventually recorded their demographic information. In return, the subjects received a coupon as a reward. In order to keep track of subjects' actual repurchase behavior, special marks were made on the coupons according to the experimental group for later calculation.

3.2.1. Preliminary experiment

Experiment 2 also used a pre-experiment to test the manipulation of perceived effort. A total of 223 participants (140 men, mean age 22) were recruited. The participants were randomly divided into two groups and asked to drink from either a plastic or biodegradable straw, and to rate their perceived effort after using it.

After screening, 197 valid samples were retained ($N_{group\ 1}$=110, $N_{group\ 2}$=87). There were significant differences in the scores of effort level between the two groups ($M_{low\ effort\ level}$=3.844, $M_{high\ effort\ level}$=4.302, t(195)= −2.782, $p = 0.06 < 0.050$), indicating successful manipulation of perceived effort.

3.2.2. Variable measurement

Variables such as reactive guilt, perceived pleasure, and perceived effort were measured in experiment 2 in the same way as in experiment 1. The measurement scale of perceived autonomy (Cronbach's $\alpha = 0.724$) referred to the research of Ryan and Powelson (1991) and Chen and Sengupta (2014). The Cronbach's α of all the constructs was $0.724 \sim 0.986$. The factor loading of each item was $0.758 \sim 0.993$. The root mean square of AVE value of each interface is larger than the correlation coefficient of other constructs, and the first principal component only accounts for 28.14% of the loading under no rotation.

3.2.3. Result analysis

1. Maneuverability Test
   The statistical results showed that the manipulation towards effort level ($M_{low\ effort\ level}$=2.635, $M_{high\ effort\ level}$=5.255, t(622)=-40.730, $p < 0.010$) was successful. The difference of pro-environmental intention ($M_{low\ actual\ autonomy}$=4.282, $M_{high\ actual\ autonomy}$=4.281, t(622)=-1.596, $p = 0.111 > 0.050$) had no effect on the results. The interactive effect of actual autonomy group and choice diversity group on perceived autonomy was significant both in the group of low actual autonomy ($M\_square(3,295)_{low\ actual\ autonomy}$=3.450, F(3,295)=414.462, $p < 0.010$) and the group of high actual autonomy ($M\_square(3,317)_{high\ actual\ autonomy}$=3.144, F(3,317)=54.279, $p < 0.010$). Comparably, the increase of perceived autonomy was greater in the group of low actual autonomy. Comparison results of mean values are shown in Figure 4:

1. Hypothesis Test
   In the group of high actual autonomy, the level of reactive guilt significantly decreased with the increase of perceived effort (β=-0.722, F(1,319)=53.280, t=-12.215, $p < 0.010$), thus H1 was supported. With the decrease of reactive guilt level, repurchase intention increased significantly (β=-0.772, F(1,319)=291.131, t=-28.902, $p < 0.010$), thus H2 is supported. The mediating effect of reactive guilt was significant ($\beta = 0.471$, LLCI = 0.397, ULCI = 0.556), and H3 was supported. With the increase of choice diversity, there was no significant difference in the mitigation effect of perceived effort on reactive guilt ($\beta = 0.020$, LLCI=-0.128, ULCI = 0.060), thus H7a was not supported. On the other hand, the mediating

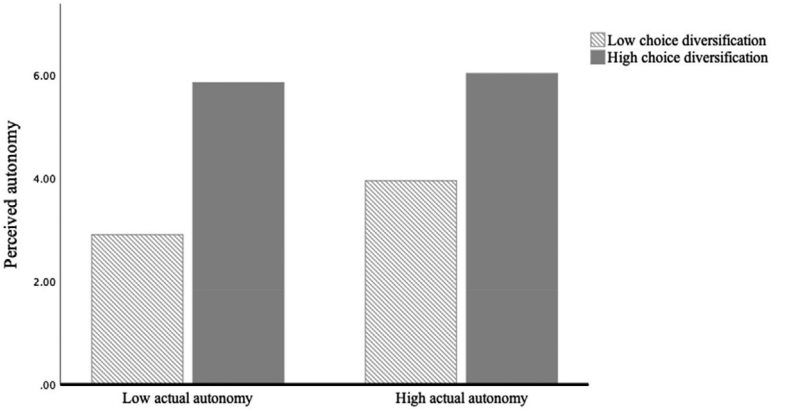

Figure 4. Mean of perceived autonomy.
Source: created by the research team.

effect of perceived pleasure was not significant (β = 0.002, LLCI=-0.022, ULCI = 0.022), and the moderating effect of choice diversification on the mediating effect of perceived pleasure was not significant (β=-0.348, LLCI=-0.858, ULCI = 0.161).

In the group of low actual autonomy, with the improvement of the perceived effort level, the perceived pleasure level decreased significantly (β=-0.661, F(1,297)=198.494, t=-24.310, $p < 0.010$), thus H4 is supported. The positive effect of perceived pleasure on repurchase intention was significant (β = 0.888, F(1,297)=103.004, t = 17.462, $p < 0.010$), thus H5 is supported. The mediating effect of perceived pleasure was significant (β=-0.096, LLCI=-0.168, ULCI=-0.029), and H6 was supported. With the increase of choice diversity, the negative effect of perceived effort on perceived pleasure was significantly weakened (β = 0.011, LLCI = 0.017, ULCI = 0.051), and H7b was supported. In contrast, the mediating effect of reactive guilt was not significant (β = 0.011, LLCI=-0.005, ULCI = 0.030), and the moderating effect of choice diversification on the mediating effect of reactive guilt was not significant (β = 0.036, LLCI=-0.013, ULCI = 0.085).

By comparison, effort of the high actual autonomy group had a significant positive impact on repurchase intention ($\beta_{\text{high actual autonomy}}$=0.775, F(1,319)=92.260, t = 16.056, $p < 0.010$). Effort of the low actual autonomy group had a significant negative impact on the repurchase intention ($\beta_{\text{low actual autonomy}}$=-0.853, F(1,297)=249.653, t=-27.339, $p < 0.010$). It is consistent with conclusion of previous studies (e.g. Zhang et al., 2011). In contrast, perceived effort in high actual autonomy group had a stronger mitigation effect on reactive guilt ($\beta_{\text{high actual autonomy}}$=-0.722, $p < 0.010$; $\beta_{\text{low actual autonomy}}$=-0.050, $p = 0.129 > 0.050$); The perceived effort of low actual autonomy group had a stronger negative effect on perceived pleasure ($\beta_{\text{high actual autonomy}}$=0.345, $p < 0.010$; $\beta_{\text{low actual autonomy}}$ =-0.661, $p < 0.010$).

In experiment 2, a total of 624 coupons were issued and 150 were recovered within a month with a recovery rate of 24.038%. According to group marks on

Table 1. Coupon recycling frequency table ($N = 149$).

	Low choice diversity (frequency)		High choice diversity (frequency)		
	Low perceived effort	High perceived effort	Low perceived effort	High perceived effort	Total (frequency)
Low actual autonomy	Group 1(10)	Group 3(6)	Group 5(20)	Group 7(24)	60
High actual autonomy	Group 2(15)	Group 4(30)	Group 6(16)	Group 8(29)	90
Total	25	36	36	53	150

Source: created by the research team.

the coupons, the usage frequency was calculated, and the results are shown in Table 1. According to Chi-square test results of perceived effort level (high vs. low), actual autonomy level (high vs. low) and choice diversity (high vs. low) showed that choice diversity had a significant moderating impact on the repurchase behavior of consumers in the group of low actual autonomy ($\chi 2 = 4.151$, $p = 0.042 < 0.050$). There was no significant moderating effect in the group of high actual autonomy ($\chi 2 = 0.905$, $p = 0.341 > 0.050$). Therefore, H7b is supported but H7a is not.

3.2.4 Conclusion and discussion

First, in the group of high actual autonomy, as perceived effort level increases, reactive guilt level decreases, resulting in a more active repurchase intention. In other words, reactive guilt has played a significant mediating role between perceived effort and repurchase intention. Second, in the group of low actual autonomy, as perceived effort level rises, level of perceived pleasure falls, leading to more negative repurchase intentions. In other words, perceived pleasure has a significant mediating effect between perceived effort and repurchase intention. Third, results of moderating effect showed that although choice diversification significantly enhanced perceived autonomy of individuals in both groups of high and low actual autonomy, however it only increased people's repurchase intention in the group of low actual autonomy, thus H7b was supported and H7a was not. That is to say, when consumers already have a high level of actual autonomy, the provision of choice diversity will not further improve consumers' perceived autonomy. The Weber-Fechner Law may well explain this phenomenon, its hypothesis proposes that the ability to distinguish between two kinds of stimulus decreases with the increase of stimulus intensity (Maglio et al., 2013). At the same time, the adaptation level theory believes that individuals will generally choose to change their attitudes and behaviors or change the stimulus itself when facing the inappropriate external environmental stimulus (Sonnenfeld, 1966), so as to reduce the incongruity and inadaptation caused by the change of stimulus level.

4. Research conclusions and prospects

4.1. Main conclusions

This paper examines the affective mediating mechanism of pro-environmental effort on people's repurchase intention through two between-subject experiments.

The results of experiments 1 and 2 both supported H1-H6. Specifically, for high autonomous subjects, the level of reactive guilt decreased as perceived effort level increased, leading to a more active repurchase intention. Reactive guilt mediates the relationship between perceived effort and repurchase intention. For low autonomous subjects, as perceived effort level increases, perceived pleasure level decreases, which leads to a more negative repurchase intention. Perceived pleasure mediates the relationship between perceived effort and repurchase intention. In contrast, high autonomous pro-environmental effort has a more significant mitigation effect on reactive guilt; Low autonomous pro-environmental effort has a more significant negative effect on perceived pleasure. In addition, experiment 2 distinguished actual and perceived autonomy as two independent variables. It is proved that choice diversification can improve the perceived autonomy of subjects in both group of high and low actual autonomy. In the group of low actual autonomy, choice diversification compensated for the lack of actual autonomy, thereby alleviating the negative effect of low autonomous effort on perceived pleasure, and finally improving people's repurchase intention. However, the moderating effect of choice diversification between perceived effort and repurchase intention was not observed in the group of high actual autonomy. Therefore, H7b is supported, H7a is not supported.

4.2. Theoretical contribution

First, the model in this paper introduces two affective mediating variables, one positive and the other one negative, to explain the affective mechanism of pro-environmental effort on repurchase intention. It was found that for high autonomous individuals, reactive guilt had a stronger explanatory power and played a mediating role in the process. However, for individuals with low autonomy, perceived pleasure has a stronger explanatory power and plays a mediating role in the process.

Second, when freedom is 'returned' during the service process, for subjects with low actual autonomy, richer options meet subjects' compensation demand for the lack of actual autonomy, thereby weakening the impact of low autonomous effort on negative emotions and improving people's willingness to repurchase, however the moderating effect of choice diversification was not observed in the group of high actual autonomy. The explanation for this, could be the improvement of perceived autonomy raised by choice diversification in the group of low actual autonomy was greater than in the group of high actual autonomy.

4.3. Management implications

First, although effort is seen as a 'loss' and a 'cost' by some consumers, it is also seen as a 'reward' by others. Merchants can help alleviate negative emotions, especially those who are prone to guilt, by offering these consumers an opportunity to pay some efforts (Kugler & Jones, 1992). For example, food delivery platforms can provide low-carbon route options with a longer waiting time; Electronic companies and fashion enterprises can offer customers recycling commitments. Merchants often offer material incentives to 'appease' consumers' negative feelings. The results of this study

prove that compared with external factors, the role of internal factors should not be ignored. As Haynes and Podobsky (2016) put it, 'A product can not only be guilt-free, but also full of redemption and integrity'.

Second, when consumers are reluctant to engage in environmentally friendly consumption, merchants can optimize service processes by providing consumers more 'power' (e.g. choice diversification) so that people can experience the 'return of freedom'.

5. Research limitations and prospects

This paper has the following limitations:

First, guilt is studied as an emotional state rather than a personality trait. The former refers to situations in which an individual experiences guilt at a particular moment, while the latter indicates that an individual tends to experience guilt (Kugler & Jones, 1992). Subsequent studies could try to include guilt as a personality trait.

Second, the influence of manipulative intention on experimental results was not considered in this paper. The observation or control of perceived manipulation of subjects can be added in future experiments. Evidence suggests that although both guilt appeals and guilt-free appeals are common marketing strategies, people's perception of marketer's manipulative intent may lead them to have a negative attitude toward the brand (Cotte et al., 2005).

Third, this paper only adopted the manipulation of perceived autonomy by increasing choice diversity, and subsequent studies can explore the influence of other methods on perceived autonomy. In addition to choice diversification (Chen & Sengupta, 2014; Howie et al., 2018; Theotokis & Manganari, 2015), weakening the sense of being observed (Zwebner & Schrift, 2020) and providing room for creativity (Dahl & Moreau, 2007; Sweeney et al., 2015), etc., have also been proved effective routs to enhance perceived autonomy.

Fourthly, this study did not consider the influence of psychological distance. Although the impact of guilt on consumer' intentions exists to varying degrees in both individualistic and collectivist countries (Onwezen et al., 2014), Chinese subjects under influence of Confucian culture are more likely to respond to appeal of guilt for beneficiaries with closer psychological distance (Chen & Moosmayer, 2020).

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Notes

1. On January 16, 2020, the "Opinions on Further Strengthening the Control of Plastic Pollution" (Development and Reform Environmental Resources (2020) No. 80) was officially released and started to be implemented. The guideline calls for a nationwide ban on the use of non-biodegradable disposable plastic straws by the end of 2020.

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