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The power of *respect for authority and empathy* – Leveraging non-cognitive theoretical constructs to trigger environmentally sustainable tourist behaviour

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ABSTRACT

Behavioural change research for environmental sustainability is currently guided almost exclusively by a cognitive paradigm, which assumes that cognitive constructs drive behaviour and must be influenced to change it. This study challenges this dominant paradigm and tests two non-cognitive theoretical constructs – *respect for authority* and *empathy* – in the context of reducing buffet plate waste. *Respect for authority* (in contrast to *empathy*) passes the manipulation check and significantly reduces plate waste in a quasi-experimental field study in a Chinese hotel, providing proof of concept for a new, urgently needed, re-orientation in behavioural change intervention design. The intervention tested in this study can immediately be deployed by tourism and hospitality businesses who want to make their buffets more cost-effective and environmentally sustainable.

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Introduction

The tourism industry negatively affects our ecosystem (Gössling, 2002; UNWTO & UNEP, 2008). Tourism activities contribute between five and 8 % of global CO₂ emissions (Lenzen et al., 2018). Emissions continue to increase, along with the renewed post-COVID-19 thriving of the industry (Yang et al., 2021; Zhu & Dolnicar, 2022). Governments and the tourism industry are reluctant to take environmental action because it has the potential to reduce industry profit at a time of recovery from a major pandemic-related disruption (Hall et al., 2020; Zhu & Dolnicar, 2022). Encouraging tourists to behave in more environmentally friendly ways when on vacation, therefore, represents a promising strategy, especially if behavioural changes by tourists lead to cost savings for tourism businesses (Dolnicar et al., 2020).

Well-developed theory-based behavioural interventions have the potential to make tourists behave in more environmentally sustainable ways while delivering financial benefits to tourism businesses. Among existing measures aimed at making consumers in general, and tourists in particular, behave in more environmentally sustainable ways, one theoretical construct dominates as the theoretical mechanism assumed to trigger changes in behaviour: the cognitive component of attitude. Attitudes are funda-

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mental building blocks of most theories that explain human behaviour in general (e.g., theory of planned behaviour, Ajzen, 1991), and environmentally friendly human behaviour in specific (e.g., value belief norm theory, Stern et al., 1999). Most attitudes, however, are cognitive in nature. Changing those attitudes requires belief-based interventions, which trigger cognitive processing and result in an adjustment of the attitudes (Stern et al., 1999). Cognitive-based approaches are particularly prevalent in tourism studies; a recent literature review reveals that more than half of the pro-environmental behavioural interventions developed and tested in the tourism context aim at changing beliefs – despite their relatively low success rate (58 %, Demeter et al., 2023).

One of the reasons for the relatively low success rate of cognitive-based pro-environmental behavioural interventions is the reliance on active cognitive processing to change attitudes and behaviour (Schwartz, 1977). An example of this is the attempt to increase the purchase of monetary carbon offsets by providing the consumer with carbon emission information of the selected flight (Babakhani et al., 2017). In this case, the change of attitude and subsequently of behaviour requires the consumer to develop problem awareness (e.g., air travels develop an abundance of carbon emissions) and ascription of responsibility to act (e.g., customers are also responsible for the emissions). The absence of either component will lead to unsuccessful attitude and behavioural change (De Groot & Steg, 2009). In contrast, non-cognitive-based attitudes – such as cultural value and emotions – are embedded within a person's value system and drive people's behaviour subconsciously (Hofstede, 2011; Schwartz, 1977). Targeting non-cognitive attitudes to bypass the reliance on active cognitive processing, therefore, becomes a promising target for pro-environmental behavioural change interventions.

The aim of the present study is to investigate the potential of targeting non-cognitive attitudes. In so doing, we challenge the currently dominant theoretical paradigm informing the development of behavioural change interventions and argue for a broadening of the theoretical bases used to inform the design of behaviour change interventions. Specifically, we investigate the potential of the affective component of attitude. As opposed to the cognitive component of attitude, the affective component of attitude represents people's "gut reaction" towards a cognition or behavioural act (Breckler & Wiggins, 1993; Ostrom, 1969). While the cognitive component of attitude alters people's actions via beliefs and objective evaluations, the affective component of attitude triggers behavioural change via feeling and emotion (Batson et al., 2002). As such, affective component of attitude is an important factor when explaining altruistic behaviours such as blood donations (Conner et al., 2013), monetary donations (Dickert et al., 2011), and altruistic leadership (Abdillah et al., 2022). In the context of pro-environmental behaviour, the affective component of attitude is strongly associated with green product purchases (Park & Ha, 2012) and animal welfare engagement (Boissy et al., 2007). People also tend to respond faster to the affective component of attitude than to the cognitive component (Van den Berg et al., 2006). Based on cultural value orientations theory (Schwartz, 2006) and the theory of planned behaviour (Ajzen, 1991), the present study develops and tests behavioural interventions that aim to trigger two affective components of attitude: *respect for authority* and *empathy*.

The study is conducted in the context of plate waste, which is edible food left behind uneaten by guests. The newly developed interventions aim to reduce plate waste among Chinese domestic tourists at an all-you-can-eat hotel buffet. Plate waste substantially burdens the global food production system, which has major sustainability implications such as growing land usage, excessive water consumption and greenhouse gas emissions (Gössling & Peeters, 2015; Intergovernmental Panel on Climate Change, 2007). When wasted, food decomposes and releases methane and CO₂, both of which drive climate change (Hall et al., 2009). The economic losses of plate waste are also considerable: the UK hospitality sector wasted 2.5 billion GBP worth of food in 2011, with 34 % representing plate waste (Waste and Resources Action Programme, 2013). In tourism and hospitality, plate waste is a serious problem; it makes up more than half of the industry's total food waste (Sundt, 2012) because people consume more food when they are on vacation (Gössling & Peeters, 2015) and leave more edible food behind uneaten, especially at hotel buffets which offer an unlimited supply of a wide variety of foods (Juvan et al., 2018). Tourists regard food as one of the most important aspects of their vacation; this level of importance is reflected in tourists spending as much as 31 % of their holiday budget on food and beverage experiences (Marrocu et al., 2015). Yet, arguably, food experiences are about consuming food, not leaving it behind uneaten. Plate waste, therefore, is unnecessary; reducing plate waste should not negatively affect vacation experiences. Reducing plate waste can, however, substantially reduce the operating costs of food providers (Dolnicar et al., 2020; Kallbekken & Sælen, 2013).

The key theoretical contribution of the study lies in challenging the currently dominant paradigm that cognitive modification of attitudes is the most promising path to behavioural change and, instead, proposes that non-cognitive attitudinal components may be equally powerful, if not more, thus representing a key area for future investigation. Findings from this study also have immediate practical implications: any interventions that are successful in reducing plate waste among tourists can immediately be adopted by food providers in tourism and hospitality to reduce cost and contribute to the United Nations Sustainable Development Target 12.3. to halve food waste by 2030 (United Nations, 2015).

Literature review

Theory of planned behaviour

As an extension of the theory of reasoned action (Fishbein & Ajzen, 1975), the theory of planned behaviour postulates that attitudes, social norms and perceived behavioural control are the three factors that influence people's behavioural intention, which leads to actual behaviour change (Ajzen, 1991). The theory of planned behaviour has been widely used in investigations of pro-environmental behaviours because it is particularly effective in explaining behaviours in "situations in which actions are not under volitional control" (Jackson, 2005, p. 48). Hotel buffets are an example of such a situation; people tend to lose some

control over how much they serve themselves, for a range of reasons (Juvan et al., 2018). As a result, plate waste generated at buffets is concerning high (Juvan et al., 2018). This is particularly prominent among Chinese tourists (Li & Wang, 2020); they view it as their obligation to enjoy themselves when on vacation and, as a result, abandon their usually excellent food waste habits from home (Liu et al., 2022).

One of the key constructs of the theory of planned behaviour is the attitude towards the behaviour. Distinct from beliefs, which can be “verified or falsified with objective criteria” (Matsumoto, 2009, p. 59), attitudes are defined as “evaluations of objects occurring in ongoing thoughts about the objects or stored in memory” (Matsumoto, 2009, p. 59). Attitudes affect people's behavioural intentions, which then lead to actual behaviour or behavioural change (Ajzen, 1991). The cognitive and affective components of attitude are two important factors that influence the attitude-behaviour relation (Millar & Tesser, 1986; Rosenberg & Hovland, 1960; Zajonc & Markus, 1982). The cognitive component of attitude can be influenced by and can influence an individual's beliefs and/or knowledge towards an object (Ostrom, 1969). Many studies on pro-environmental behaviour aim to trigger behavioural change by providing factual information to make cognitive components salient, such as the environmental impact of the behaviour (Rondoni & Grasso, 2021) or social expectations about the behaviour (Reese et al., 2014). Researchers believe that information can shape people's beliefs towards the behaviour, which then leads to behavioural intention and actual behaviour (Ajzen, 1991; Fishbein & Ajzen, 1975).

The affective component of attitudes emphasises feelings and emotional responses towards an object (Jorgensen & Stedman, 2001; Rosenberg & Hovland, 1960). Researchers discovered that *empathy* plays an important role in predicting people's emotional attitudes and pro-environmental behaviours (Berenguer, 2007; Cialdini et al., 1997; Mayer & Frantz, 2004). *Empathy* requires people “experiencing another's thoughts, feelings, and perceptions” (Matsumoto, 2009, p. 180). Distinct from the cognitive-based constructs, the perception of the need for help (*empathy*) is typically a psychological process that does not involve self-consciousness (Schwartz, 1977). People are able to develop empathetic emotions towards both humans and the natural environment (Batson et al., 2002) and if they perceive the suffering of others as serious, they grow a stronger *empathy* which is more likely to lead to behavioural intention and actual behaviour (Berenguer, 2007).

Empathy emerged as an effective tool to improve overall attitudes towards stigmatised groups (Batson et al., 2002; Stephan & Finlay, 1999), the environment (Schultz, 2000), and nature (Cheng & Monroe, 2012). Most research leveraging the construct of *empathy* focuses on inducing empathetic emotion towards a natural object (animals and plants) to improve pro-environmental attitude (Batson et al., 2002; Schultz, 2000), for example, using a picture of a seal caught in a fishing net to improve the overall attitude towards animal wellbeing and pro-environmental behaviour (Schultz, 2000). There is also some research involving leveraging empathetic emotion towards humans to improve pro-environmental attitudes. In fact, empathetic emotion towards a certain group can be effectively translated to attitude change towards pro-environmental behaviour. One famous example is the ‘Crying American Indian’ public service advertising in the 1970s, which aimed to raise public awareness towards pollution in the U.S. The campaign was hugely successful and had a lasting impact on changing the public's environmental attitude by showing an American Indian kayaking through a polluted river and holding back his tear while watching people litter on the highway (Strand, 2008).

Previous research also demonstrates that *empathy* as a psychological characteristic varies across cultures (Chopik et al., 2017). Compared to highly individualistic cultures, people from highly collectivist cultures experience stronger empathetic emotions when exposed to the same stimuli (Chopik et al., 2017; Heinke & Louis, 2009). We therefore hypothesise that leveraging *empathy* towards farmers' hardship in producing food could change the overall attitude towards plate waste among Chinese tourists from a highly collectivistic culture (Hofstede, 2011; Schwartz, 2006). The change of overall attitude could subsequently lead to actual behaviour change.

H1. Emphasising farmers' hardship in food production will lead to higher *empathy* towards farmers among Chinese tourists.

H2. Targeting *empathy* for farmers will subsequently trigger Chinese tourists' behavioural compliance to reduce plate waste.

Empirical assessment of hypothesis H2 in a study is only relevant after having empirically confirmed hypothesis H1.

Cultural value orientations theory

Cultural value orientations theory (Schwartz, 2006) postulates that residents of different countries differ significantly in terms of their value orientations. Culture value orientations have subtle, yet lasting, influence and subconsciously regulate a person's attitudes and behaviours. Based on results from the Schwartz value survey (Schwartz, 1992; Schwartz & Boehnke, 2004) and the European social survey (European Social Survey, 2003), cultural value orientations theory identifies three bipolar value dimensions that represent how societies resolve omnipresent problems: *embeddedness* versus *autonomy*, *hierarchy* versus *egalitarianism*, and *mastery* versus *harmony*. The contrast between *embeddedness* and *autonomy* reflects how people balance their personal desire and collective outcome (Schwartz, 1992). The contrast between *hierarchy* versus *egalitarianism* reflects how people balance equality and social power. The contrast between *mastery* versus *harmony* reflects how people manage their role in the natural and social world. With all values considered bipolar in nature, if a society underlines one value (for example, *embeddedness*), it will understate the polar opposite value (for example, *autonomy*; Schwartz, 2006).

Cultural value orientations theory views cultural value as an aggregation of beliefs, practices, norms and values in a society (Schwartz, 2006). Under this concept, the value that is most emphasised by a society represents the core feature of the culture and defines the nature of behaviour (e.g., desirable or undesirable) in society. For example, compared to a society that values

egalitarianism, listening to the voice of authority is a much more desirable behaviour in a society that values *hierarchy*. The main criticism of this view is that it ignores the dynamics of culture, which may vary over time (Kitayama, 2002). This same criticism holds for most cultural theories, including Hofstede's cultural dimension theory (Hofstede, 2011) and Inglehart's world values theory (Inglehart & Baker, 2000). Additionally, cultural value orientations have been shown to be relatively stable, with some elements able to persist for hundreds of years (Hofstede, 2001; Schwartz et al., 2000; Putnam et al., 1992). Change in cultural value is a slow process as those values represent an integral part of social structures, social demographics and the history of culture (Schwartz, 2006).

Tourism researchers have used cultural value orientations theory to investigate various tourism-related phenomena, including travel motivation and event participation (Yan & Halpenny, 2019), consumption of international services (Hsu et al., 2013), destination image (Stepchenkova et al., 2015) and pro-environmental attitude and intention (Filimonau et al., 2018). Results suggest that – compared to other mainstream culture theories such as Hofstede's cultural dimension theory (Hofstede, 2011) and Inglehart's world values theory (Inglehart & Baker, 2000) – cultural value orientations theory is theoretically and empirically more useful for investigating people's consumption patterns on vacation (Hsu et al., 2013). This may be because cultural value orientations theory has a stronger theoretical foundation and is built upon more recent data (Steenkamp, 2001).

Our study focuses on the *hierarchy–egalitarianism* axes of the cultural value orientations theory because we aim to leverage *respect for authority* to change people's overall attitude towards plate waste. In a highly *hierarchical* culture, values such as social order and obedience are emphasised, subconsciously steering individuals to value the order from higher hierarchy members because of the high power distance (Hofstede, 2011; Schwartz, 2006). In cultures with high *egalitarianism*, values such as pleasure, freedom, and enjoyment are emphasised, subconsciously steering individuals to live the way they like because they view themselves as autonomous entities.

The cultural value difference is also shown in people's attitude towards the information they receive (Johnson et al., 1968). Although the degree of perceived credibility of information holds a broad influence (Bannister, 1986; Mugny et al., 2000), evidence from communication research demonstrated that the voice of a highly credible person has stronger influence on authoritarianists' attitudes (Johnson & Steiner, 1967). People from a high-hierarchy culture, therefore, are more likely to display behavioural compliance with the voice of authority (Pornpitakpan, 2004) and change their overall attitude (Johnson & Steiner, 1967) because of *respect for authority* (Hofstede, 2011; Schwartz, 2006). People from a highly hierarchical culture have a lower tolerance for ambiguity, which makes the voice of authority the basis of their judgements, bypassing cognitive processing (Sternthal et al., 1978). This is particularly prominent when the presented information has no room for the argument (Johnson & Steiner, 1967) and brief (Johnson & Izzett, 1969) as source credibility becomes the sole criterion for attitude judgement (Pornpitakpan, 2004). In the context of plate waste reduction, we hypothesise that people from a culture with high *hierarchy* values will be more likely to reduce their plate waste if presented with a clear instruction from the voice of authority to do so.

H3. In a culture that has high *hierarchy* values, the voice of a society member with high authoritarian power will trigger people's *respect for authority*.

H4. Targeting *respect for authority* will subsequently trigger behavioural compliance in line with the voice of authority.

Again, empirical assessment of hypothesis H4 in a study is only relevant after having empirically confirmed hypothesis H3.

Methodology

Study overview

We develop and test two non-cognitive-based behavioural interventions aimed at reducing the amount of plate waste generated at hotel buffets by Chinese guests, which – according to cultural value orientations theory – hold high *hierarchy* values (Schwartz, 2006). The interventions are tested empirically in two separate studies. Study 1 is a survey study and serves as a manipulation check to determine whether the newly developed interventions are successful in triggering the constructs hypothesised in the underlying theories to drive behaviour. The manipulation check is necessary because the field study (using actual behaviour as dependent variable) measures behavioural change but cannot provide insights into the reason for the change in behaviour (Viglia & Dolnicar, 2020). Interventions that pass the manipulation check are then tested in a quasi-experimental field experiment (Study 2). The aim of Study 2 is to test whether the interventions translate into an actual reduction in plate waste at a real hotel buffet.

The reason we use a combination of a survey study and a quasi-experimental field study is to ensure our research design has high validity; that it *'measures what it purports to measure'* (Carmines & Zeller, 1979, p. 4). Survey studies have high internal validity because all independent and intervening variables can be controlled. As a result, any changes in dependent variables can be attributed to the intervention (Schram, 2005). Researchers can control and manipulate variables in the survey studies to make sure it is the intervention that triggered the corresponding psychological constructs. This high internal validity comes at the price of low external validity: survey findings do not always generalise in the real world for many reasons, including survey respondents displaying social desirability bias (Fisher, 1993). A subsequent quasi-experimental field study can address this problem. Despite the quasi-experimental field study having lower internal validity due to various uncontrollable variables, the high external validity makes the findings more generalisable, which means that what happened in the experiment will be more likely to happen in the real world. Considering the nature of our study and our goal to make significant theoretical and managerial

implications, we chose the combination of survey study and a quasi-experimental field study to maximise both the internal and external validity of our findings.

The study received approval from the Ethics Committee of The University of Queensland (2020/HE002909).

Study context

The relevant context for the study is the Clean Your Plate Campaign (光盘行动) in China. The Chinese hospitality industry initiated this campaign in 2013 and it soon became one of the most influential buzzwords of the year (Wang et al., 2022). The principle of the campaign is to advocate for the public to reduce their plate waste when they eat out by either finishing all edible food on the plate or taking it back home. The campaign has been heavily promoted by the hospitality industry and non-governmental organisations. On the 11th of August 2020 Chairman Xi Jinping endorsed the campaign by giving key instructions on reducing plate waste in both public and private restaurants (Xian & Bian, 2020). Xi pointed to the substantial amount of plate waste generated nationwide and appealed to the public to be aware of the consequences of such waste. Many regional governments launched their own Clean Your Plate Campaign guidelines for public food services and the hospitality industry. Domestic media were actively supporting Xi's public statements and regarded the Clean Your Plate Campaign as an important measure to maintain national food security during the COVID-19 pandemic (Song & Xu, 2021).

Interventions

The first intervention leverages the high *hierarchy* values in Chinese society, which implies that people are more likely to demonstrate behavioural compliance because of the *respect for authority* (Hofstede, 2011; Pornpitakpan, 2004; Schwartz, 2006). Given that the Clean Your Plate Campaign was endorsed by Chairman Xi – the highest leader of the Chinese government who has high credibility within the nation – we hypothesise that using a direct quote from the Chairman will evoke people's *respect for authority* and change their attitude towards plate waste. We expect the activation of *respect for authority* to translate into Chinese tourists leaving less uneaten food behind on their plates at all-you-can-eat hotel buffets. The purpose of Study 1 is to test whether the message indeed activates *respect for authority* (hypothesis H1). The purpose of Study 2 is to test if the message translates to reduced plate waste (hypothesis H2). Hypothesis H2 is only tested if the intervention passes the manipulation check.

The table sign used to communicate the messaging used for the first intervention shows a Chinese landmark building in the background and presents Chairman Xi's quote in the middle, stating 'Clean Your Plate Campaign, Chairman says thriftiness is applaudable (光盘行动, 习主席号召我们节约为荣)' (see Fig. 1).

The second intervention leverages *empathy* to reduce plate waste by using a very culture-specific stimulus: a poem all Chinese children learn in school, which speaks of the hardship Chinese farmers experience as they produce food for people to eat, effectively increasing the *empathy* children feel towards the farmers. This *empathy* – in turn – may lead to behavioural intention and actual behaviour. The purpose of Study 1 is to test whether the message used in the second intervention indeed activates *empathy* towards farmers (hypothesis H3). The purpose of Study 2 is to test if the message used in the second intervention translates to reduced plate waste (hypothesis H4). Hypothesis H4 is only tested if the second intervention passes the manipulation check.

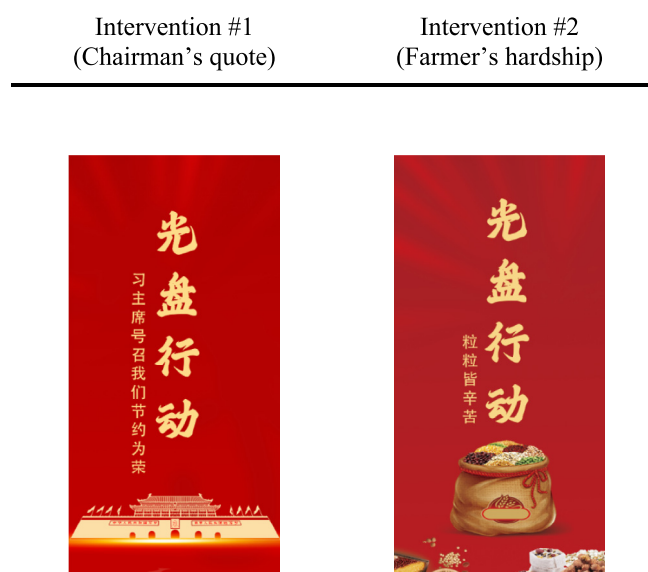


Fig. 1. Table sign designs.

The table sign for the second intervention depicts a bag of rice in the background and presents the quote from an ancient Chinese ancient poem all Chinese children learn at school: 'Clean Your Plate Campaign, every single grain means hardship (光盘行动, 粒粒皆辛苦)' (see Fig. 1).

Study 1 – manipulation check

We recruited 318 Chinese respondents online through the survey recruitment website Sojump – a widely used survey platform in China used by academic and market researchers. All respondents had to pass a filter question to qualify for participation in the main study. The filter question ensured that they had eaten at a hotel buffet in the past two years and that they were not gaming eligibility (by agreeing to a series of questions about unlikely past behaviours). Specifically, we asked respondents if – in the last two years – they (1) have eaten at a hotel buffet, (2) have purchased a first class flight ticket, (3) have stayed in a youth hostel. We eliminated respondents without hotel buffet experience and those who ticked "Yes" to all questions because those three events are very unlikely to co-occur.

In the main survey study, respondents who passed the filter question were primed to imagine eating at a hotel buffet and were then randomly assigned to one of three conditions: a control condition and two experimental conditions. The control group ($n = 109$) did not see a sign. Experimental group 1 ($n = 106$) saw the Chairman's quote sign and experimental group 2 ($n = 103$) saw the farmers' hardship quote. After seeing the signs, respondents answered general questions about what they value during their buffet experience (e.g., food variety, food quantity, nutrition balance, Chinese food culture), and whether they care if other guests see them overfilling their plates or returning to the buffet multiple times. Respondents recorded their responses on a visual analogue scale ranging from 0 (not important at all) on the left to 100 (extremely important) on the right.

We tested whether the interventions activated the targeted psychological constructs by asking participants the following questions: 'During your buffet experience, how important were the following aspects to you: the government expects me to eat up everything that is on my plate; showing respect for the farmers who produced the food'. Respondents recorded their answers on a visual analogue scale ranging from 0 to 100.

We summarised responses using medians and robust standard deviations for the control group and the experimental group where the relevant psychological construct was targeted. The differences in distributions of the responses between the two groups are assessed to detect a shift in location based on a 95 % confidence interval for the difference in medians and a Wilcoxon rank-sum test. The power of the Wilcoxon rank sum test is assessed assuming different positive shifts of the median for a sample size of 100 and a significance level of 5 % using sampling-based methods by bootstrapping from the observations obtained in the control condition and taking the admissible range of values into account using 10,000 replications.

Study 2 – quasi-experimental field study

In Study 2, we tested the effectiveness of the interventions that passed the manipulation check in Study 1 in a quasi-experimental field study. The quasi-experimental field study is necessary for two reasons: (1) observed actual behaviour is the most valid measure of intervention effectiveness (Fisher, 1993; Goodman & Paolacci, 2017), especially when measuring socially undesirable behaviours such as leaving uneaten food behind (Stöckli et al., 2018). (2) Controlling the presence or absence of the intervention makes conclusions about cause-and-effect relationships possible. A perfect field experiment would also allow random assignment of guests to the experimental condition. This is not possible when conducting experiments in a hotel that is operating as normal, which is why our study is quasi-experimental in nature.

We conducted the field study at the four-star rated Shuyang Wisdom Hotel located at the centre of Shuyang County, Jiangsu province. In the last two decades, Shuyang has shown its great economic potential and ranked as the most developed county in the northern Jiangsu area. In 2017, Shuyang was declared part of the 13th Five-Year Tourism Development Plan in Jiangsu province, which aims to attract more visitors to its historical flora and hydrologic resources. Shuyang Wisdom Hotel operates 143 guest rooms, catering primarily to Chinese guests, with most of them visiting for business (50 %) or to attend a function (30 %). Only about one fifth of the hotel's guests are leisure tourists. The hotel has three food service areas: a Chinese-style dining hall, a Western-style dining hall and a café. Our field study took place in the Western-style dining hall, which also functions as the space where buffet style meals are served. Buffets are available to hotel guests during breakfast and lunch.

The dependent variable is plate waste per person per day defined as edible food left behind on the plate by guests eating at the hotel buffet in grams divided by the number of guests who ate at the buffet on any given day. We measured the number of people using an overhead double camera people counter located at the entrance of the buffet and total plate waste with an electronic weight scale placed under the plate waste bin in the buffet kitchen (Dolnicar et al., 2023). Hotel staff were trained (1) to ensure all plate waste is disposed of only in the bin used in the experiment (which was the bin normally used for this purpose), and (2) to not remove or relocate any of the table signs. All data was transmitted using wireless technology to a central database.

As the only condition that passed the manipulation check, we tested the Chairman's quote as a single experimental condition against a control condition in the field. In the experimental condition, we placed a table sign (15 cm high and 10 cm wide) on each dining table using the exact same design as in Study 1 (see Fig. 1). In the control condition, no sign was on the tables. We ran the experimental condition for 28 days (16th October 2021– 13th November 2021) and the control condition for 29 days (23rd November 2021– 21st December 2021). We deliberately left a nine-day window between the control and experimental condition to reduce the chance of guests being exposed to two different conditions during their stay. Shuyang Wisdom Hotel experienced multiple lockdowns and was used as a quarantine hotel during different periods. From mid-October to mid-

December there was no COVID-19 outbreak in Shuyang and the surrounding area, which created a two-month steady guest flow for our data collection. We include a project timetable in the additional material to illustrate the operation/lockdown history of the hotel.

We summarise the number of people eating in the restaurant every day, the total plate waste (in kg) per day and plate waste per person per day (in g) separately for the control group and for experimental group 1 using means, standard deviations, skewness and kurtosis. We then compare the average number of people in the control group and in experimental group 1 using a two-sample *t*-test. The average waste per person and day (in g) in the control group and experimental group 1 are compared using a weighted linear regression model with weights corresponding to the number of people eating in the restaurant. The estimated effect of the experimental condition on the average plate waste per person and day is reported together with the standard error and *p*-value of the corresponding *t*-test. The power of identifying the effect in this way is assessed by assuming different reductions in the average waste per person for a significance level of 5 % using sampling-based methods by permuting the residuals of the fitted model and associated weights and subtracting the assumed effect from the experimental group 1 condition using 10,000 replications.

Results

Study 1 – manipulation check

Study 1 confirms that *respect for authority* is higher for respondents in experimental group 1 than for respondents in the control group. Respondents in experimental group 1 who saw the Chairman's quote reported a median value of 92 on the question if they agreed that the government expects them to eat up everything on their plate whereas respondents in the control group only reported a median value of 84. The median difference is 8 and this shift to higher values for the experimental group is also confirmed by the 95 % confidence interval for the difference in medians which ranges from 2.3 to 13.7 and the Wilcoxon rank-sum test ($W = 4582$, $p\text{-value} = 0.0082$). This indicates that respondents who saw the Chairman's quote displayed a significantly higher value for *respect to authority* than respondents in the control condition. Hypothesis H3, therefore, is supported. In contrast, Study 1 fails to indicate that *empathy* towards farmers is higher for respondents in experimental group 2 than for respondents in the control group with the *p*-value of the Wilcoxon rank-sum test being equal to 0.1251. In both groups the median values are comparable (88 for the control group versus 90 for experimental group 2) with a median difference of 2 and the 95 % confidence interval for the difference in medians covering zero. This means that the *empathy*-based intervention failed to trigger *empathy* for farmers, which contradicts our initial hypothesis H1 and the manipulation check for experimental group 2 was unsuccessful. Therefore, the *empathy*-based intervention was not included as an experimental condition in the quasi-experimental field study and hypothesis H2 was not tested. Table 1 summarises the manipulation check results. The power analysis indicates that a sample size of $n = 100$ is sufficient to identify an increase in the median of 10 (or 8) with a power of at least 0.99 (or 0.90) for both constructs. A median shift of 5 would only have a power of at least 0.44 for both constructs, but such a size of the shift would also be deemed negligible.

Study 2 – quasi-experimental field study

Fig. 2 shows the results from Study 2. The figure contains three panels. Each panel shows a different variable: the number of guests in the restaurant per day, the total plate waste (in kg) per day and the average plate waste per person (in g) per day. The first panel indicates that the number of guests eating at the restaurant during the control period is comparable to that during the experimental group 1 period. The average number of people eating in the restaurant is 148 for the control as well as for the experimental group 1 (*t*-test statistic: 0.006, *p*-value = 0.995). In panel 1 in Fig. 2, the average values for the control and experimental group 1 are indicated separately by the horizontal lines. The grey shaded areas show the approximate 95 % confidence intervals for the mean estimates. Panel 2 shows that the average total plate waste is lower during the period of time when experimental group 1 was observed than during the control group period.

These results do not, however, account for the difference in the number of guests at the buffet. Panel 3 shows the average waste per person (in g) per day, indicating that the average waste per person dropped significantly from control to experimental condition. The average plate waste generated per person in the control group is 211 g per day, compared to only 197 g in experimental group 1. A guest in experimental group 1 left behind uneaten 13.9 g less (standard error = 2.59, *p*-value < 0.001) than a

Table 1
Manipulation check results.

Construct	Condition	n	Median	Robust standard deviation	95 % confidence interval	<i>p</i> -Value
Respect for authority	Control group	109	84	16.3	(2.3, 13.7)	0.0082
	Experimental group 1	106	92	14.1		
Empathy for farmers	Control group	109	88	17.8	(−3.5, 7.5)	0.1251
	Experimental group 2	103	90	14.8		

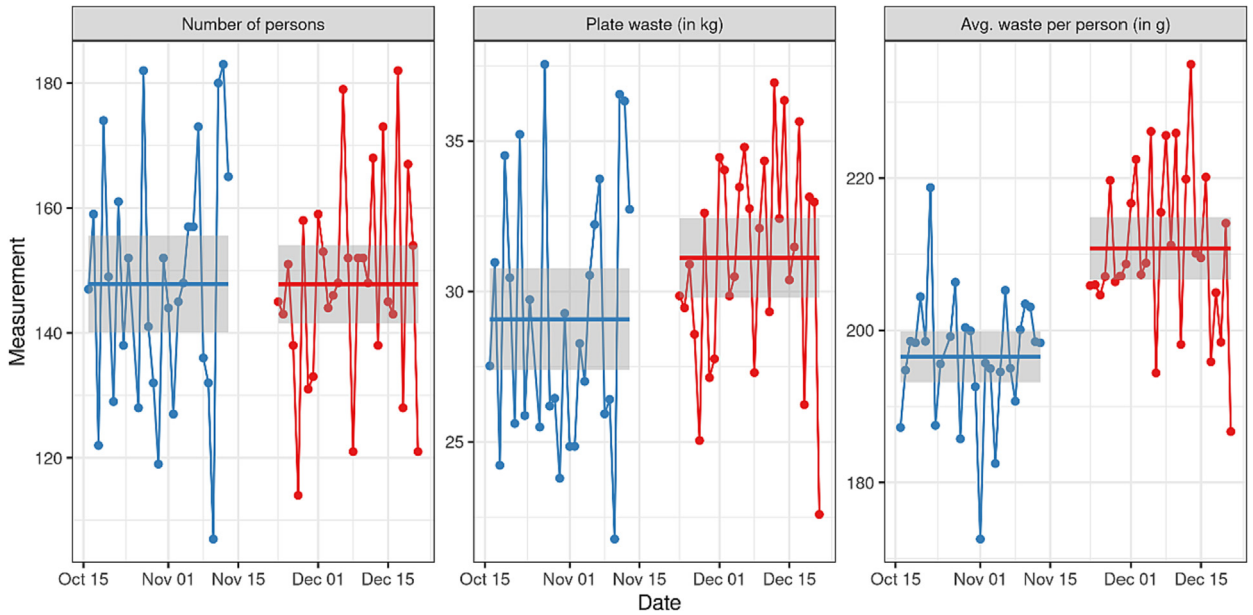


Fig. 2. Study 2 results (experimental group 1 in blue first; control group in red last).

guest in the control group, on average. This indicates that placing signs with a quote from the Chairman about reducing plate waste on dining tables significantly reduced the average plate waste generated at the hotel buffet per person per day among domestic Chinese hotels guests – from 211 g to 197 g. Our hypothesis H4, therefore, was supported. Using a table sign which builds on *respect for authority* triggered behavioural compliance: significantly less plate waste per person per day produced in the experimental group compared to the control group.

A descriptive summary of the measurements of the field experiment is provided in Table 2. The power analysis indicates that for a decrease in average waste per person of 10 g this procedure has an excellent power of 0.97. The power would be insufficient for a reduction in average waste of 5 g where the power obtained is only 0.46.

Overall, the empirical results from the survey study support hypothesis H3, but not hypothesis H1. The intervention aiming at increasing *respect for authority* triggered the intended construct in a sufficient way, whereas emphasising farmer’s hardship did not succeed in sufficiently increasing *empathy*. Thus, only the intervention based on *respect for authority* was tested in a quasi-experimental field study where it could significantly decrease the amount of plate waste generated per person per day, thus confirming hypothesis H4.

Conclusions and discussion

Main findings

The United Nations is calling for food waste to be halved by 2030 under its Sustainable Development Target 12.3 (United Nations, 2015). This study contributes to the achievement of this aim by developing and testing two theory-based behavioural change interventions aiming to reduce plate waste among Chinese tourists. Chinese tourists are an attractive market segment because they represent a large and growing market of tourists (UNWTO, 2019). They also generate more plate waste on vacation than tourists from other cultures, including some collectivist cultures because, among other things, they have a strong

Table 2
Descriptive summary of the measurements in the field experiment.

Measurement	Condition	n	Mean	SD	Skewness	Kurtosis
Number of persons	Control group	29	147.79	16.54	0.08	-0.38
	Experimental group 1	28	147.82	19.92	0.08	-0.84
Plate waste (in kg)	Control group	29	31.12	3.47	-0.44	-0.45
	Experimental group 1	28	29.08	4.37	0.41	-1.08
Avg. waste per person (in g)	Control group	29	210.78	10.85	0.06	-0.38
	Experimental group 1	28	196.53	8.61	-0.32	1.32

understanding that they have a right – an obligation almost – to let themselves go and allow themselves to enjoy when on vacation (Liu et al., 2022).

Leveraging cultural value orientations theory and the theory of planned behaviour, this study developed two behavioural change interventions based on two non-cognitive attitudinal constructs. One intervention aimed to activate *respect for authority*, the other one targeted *empathy* for farmers. While in the survey study in the sample both interventions increased the target construct in the manipulation check, only the *respect for authority*-based intervention led to a statistically significant increase. As a result, the effectiveness of only this intervention on changing real consumer behaviour was then tested in a quasi-experimental field study in a hotel in China. Results indicate that the intervention has successfully reduced average plate waste per person per day by 13.9 g which corresponds to a reduction of 6.8 %. This result is also in line with a recent second-order meta-analysis, which discovered that the mean treatment effect of pro-environmental interventions in field experiments is about 7 % (Bergquist et al., 2023). Deploying such an intervention, therefore, has the potential to achieve considerable positive long-term accumulated environmental impacts considering the population of China and the frequency with which Chinese people dine out. This intervention is also cheap to implement (around \$2 per table sign) and does not require any other changes to infrastructure or create more work for employees, making it easy to implement.

The success of the *respect-for-authority*-based intervention offers additional empirical evidence for the fact that culture-specific behavioural interventions are particularly effective in triggering behavioural change among consumers (Schiffman et al., 2013) and in clinical psychology (Hall et al., 2016). In the field of tourism research, the importance of accounting for cultural value in tourist behaviour is generally acknowledged (Correia et al., 2011; Dejbakhsh et al., 2011; Filimonau et al., 2018). Yet, only a few behavioural interventions have been developed that actively leverage this insight. Our study further confirms the power of non-cognitive-based behavioural interventions and offers a promising avenue for researchers who are interested in promoting pro-environmental behaviours on vacation. Our study does not claim, however, that all non-cognitive attitudinal interventions will be effective; different interventions need to be tested separately in field experiments to determine their specific effectiveness.

The *empathy*-based intervention was unsuccessful in triggering people's *empathy* for farmers. This result should not undermine the value of *empathy*-based behavioural interventions. One plausible explanation for its failure in our study is that the stimulus to trigger *empathy* for farmers may not have been salient enough. Salience could be increased by using a video clip, known to represent an immersive yet effective way to trigger empathetic emotion (Light et al., 2015). Using a video clip is not very practical, however, in an uncontrolled restaurant environment, especially in high-end restaurants.

Theoretical and managerial implications

The findings of the study offer additional empirical evidence for prior work in other contexts which conclude that culture-specific interventions are particularly effective (Benish et al., 2011; Hall et al., 2016; Varjas et al., 2005). Results align with cultural value orientations theory, confirming that *respect for authority* matters in cultures with high *hierarchy* values (Schwartz, 2006). *Empathy*, which was widely used to leverage pro-environmental behaviours in the past (Cheng & Monroe, 2012; Schultz, 2000), failed to activate the corresponding psychological construct of *empathy* with farmers. Although the importance of non-cognitive-based interventions is well understood in triggering pro-environmental behaviours, the cognitive paradigm still dominates the development of behavioural change interventions in the field of tourism research, and in the social sciences more broadly. Researchers still rely heavily on cognitive-based behavioural change interventions and aim to increase pro-environmental behaviours by altering beliefs (Demeter et al., 2023). This study challenges this ruling paradigm and demonstrates that non-cognitive theoretical constructs represent a highly effective alternative for the design of future behavioural change interventions.

The study is also of immediate value to tourism managers: the intervention that passed the manipulation check (and successfully triggered a sense of *respect for authority*) and was proven to significantly reduce plate waste at a hotel offering an all-you-can-eat buffet in China, can be immediately deployed by other food service providers catering to this market segment. The intervention is attractive to managers because it is very affordable; only table signs need to be printed and placed on dining tables. Importantly, this intervention does not limit the freedom of guests; they are free to take as much food as they want from the buffet and are not punished for leaving uneaten food behind. Yet, the potential for achieving cost savings is substantial, as less food waste translates into less food having to be purchased, prepared, served and disposed of. Most importantly in terms of the United Nations Sustainable Development Goals, less food waste means a smaller burden on the environment from business activities in tourism and hospitality.

Limitations and further research

Our study was conducted in the Chinese domestic environment where we expect *embeddedness* and *hierarchy* values to be dominant and assume the local cultural context to have a strong influence on tourist behaviour (Boniface, 1998; Mak et al., 2012). It would be valuable in future research to replicate our study outside of China in a tourism context with a high proportion of Chinese guests. Also, because of the location of the hotel, the participants in the quasi-experimental field study are predominantly business travellers, representing a very specific tourist segment. We were unable, therefore, to determine whether there were differences in the plate waste behaviour of business and leisure travellers (Chen, 2017). Future research could replicate our intervention in both a leisure and a business hotel and determine in which contexts it is more effective. We expect that higher plate waste savings will be achieved in the leisure hotel where the cultural tendency to let oneself go and

enjoy will be more prevalent (Liu et al., 2022). The culture-specific nature of the intervention also implies that it might not be effective among international travellers from different cultural backgrounds. For example, our intervention may not produce the same results in hotels outside China that cater for guests from countries that value *egalitarianism*, such as Australia. A final limitation is our inability to investigate the effects of guest composition on the results. This was not possible because Chinese hotels are not allowed to share guest characteristics, even if measures are taken to protect the identity of guests. A previous study found that families produced the most plate waste per person, indicating the importance of accounting for guest composition in plate waste studies (Juvan et al., 2018). This is another task for future research: in studies conducted in countries other than China, it may be possible to include some additional guest characteristics (such as age, gender, length of stay, first time or repeat visitor) in the analysis, allowing for further insights into potentially systematic variations in the effectiveness of the intervention.

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CRedit authorship contribution statement

Oscar Yuheng Zhu: Conceptualisation, Methodology, Formal analysis, Writing (original draft), Visualisation **Hongwei Li:** Data curation **Bettina Grün:** Methodology, Formal analysis, Writing (original draft), Visualisation, Supervision **Sara Dolnicar:** Conceptualisation, Methodology, Writing (review & editing), Funding acquisition, Project administration, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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