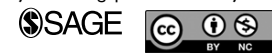


A Sharing-Based Approach to Enticing Tourists to Behave More Environmentally Friendly

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Sara Dolnicar¹, Ljubica Knezevic Cvelbar², and Bettina Grün³

Abstract

Tourist behavior has a critical impact on the environmental sustainability of tourism. The hedonic nature of tourism and lack of an economic incentive make tourist behavior particularly hard to change. Making tourists behave more environmentally friendly would have substantial environmental benefits. This is the aim of the present study. Three alternative approaches are tested. The most successful approach—based on sharing monetary savings with guests—leads to a 42 percent change in one specific tourist behavior with negative environmental consequences. This new sharing-based approach significantly outperforms current approaches of increasing awareness of environmental consequences and of tourist ability to make a change. Tourism businesses should consider replacing current appeals with sharing-based schemes.

Keywords

sustainable tourism, equity theory, value-belief-norm theory, attribution theory, theory of environmentally significant behavior, quasi-experiment

Tourism is the fourth largest economic contributor globally and outperforms the growth of the world economy (United Nations World Tourism Organization [UNWTO] 2013). But tourism also pollutes water and air, depletes natural resources, generates waste, and contributes to global warming. Not surprisingly, therefore, tourism is the fifth largest polluting industry, generating 5 percent of global CO₂ emissions with aviation contributing 40 percent, cars 32 percent, and accommodation 21 percent (UNWTO and United Nations Environment Program [UNEP] 2008). Assuming continuing growth, the UNWTO and UNEP (2008) predict that CO₂ emissions from tourism will more than double from 2005 to 2035.

A key motivation of tourism businesses to adopt measures that reduce negative effects on the environment resulting from their operations is the potential to reduce operating cost (Becken and Dolnicar 2016). However, such measures typically require a substantial upfront investment. Most tourism businesses are small and medium-sized. Many of them cannot afford implementing sustainability measures (Berry and Ladkin 1997). Not surprisingly, therefore, there is a significant gap between environmental intentions and actions taken by the tourism industry (Knowles et al. 1999) with “greenwashing” and “pressures from the balance sheets” being stated as key reasons for the gap (Bramwell and Lane 2002). Given the difficulties in the adoption of environmentally sustainable practices from the supply side, alternative approaches—especially demand-side approaches—need to be identified, tested and—if shown to be promising—pursued.

One such alternative approach is to induce voluntary behavioral change in tourists. But changing human behavior—while theoretically attractive—“is an ongoing challenge in psychology, economics, and consumer behavior research” (Baca-Motes et al. 2013, 1070).

In the home context, a number of interventions have proven effective in changing behaviors with immediate environmental consequences such as reducing energy consumption (e.g., Kua and Wong 2012) and increasing recycling (e.g., Schultz 1999). Not so in the tourism context. The difficulty with changing tourist behavior is that tourism is set in a highly hedonic context characterized by relaxation and enjoyment, much in contrast to sacrifices made for the benefit of the planet as a whole. Therefore, for most people, the level of environmentally sustainable behavior drops substantially from the home to the vacation context (Dolnicar and Grün 2009). Even people who volunteer for environmental organizations, such as Greenpeace, do not behave particularly environmentally friendly when on vacation. Instead,

¹UQ Business School, The University of Queensland, Brisbane, Queensland, Australia

²Faculty of Economics, The University of Ljubljana, Ljubljana, Slovenia

³Department of Applied Statistics, Johannes Kepler University Linz, Linz, Austria

Corresponding Author:

Bettina Grün, Department of Applied Statistics, Johannes Kepler University Linz, Altenbergerstraße 69, 4040 Linz, Austria.
Email: bettina.gruen@jku.at

they offer a wide range of justifications for this mismatch between attitudes and actions, many of which relate directly to the uniquely hedonic context of tourism (Juvan and Dolnicar 2014). Another difficulty is that tourists typically do not benefit directly from any monetary savings related to displaying the desirable behavior. Saving electricity at home means cost savings. But in the hotel it does not reduce the room rate. The exception are budget accommodation providers who charge separately for additional resource-intensive services such as room cleaning. In most cases, it does not pay off financially for tourists to behave in an environmentally friendly way. Finally, recent findings suggest that proenvironmental appeals alone are insufficient to change the behavior of tourists to be more environmentally friendly (Dolnicar, Knezevic Cvelbar, and Grün 2017).

The present study addresses the problem of environmental damage caused by tourism and acknowledges that tourists may be reluctant to change their behavior to save the planet and that accommodation providers may not embrace measures which will increase their cost. Interventions are designed and tested which aim at inducing voluntary opting out of the daily room clean by hotel guests in high end hotels and thus—in the hotel in which the present study was conducted—save 1.5 kWh of electricity and 100 ml of chemicals per waived room clean. The interventions are low-cost and can easily be adopted by accommodation providers of all sizes and star ratings internationally. If proven successful, any of the tested interventions have the potential to substantially reduce the negative environmental impacts of tourism through only very small individual behavioral changes, which, however, could be triggered in many million tourists. Therein lies the practical contribution of this study. The main contribution this study makes to theory is to point to promising approaches to changing tourist behavior with environmental consequences that do not rely on appealing to proenvironmental values.

Theories of Human Behavior

Proenvironmental behavior is behavior that intentionally seeks to minimize the negative impact of human actions on the environment (Kollmuss and Agyeman 2002). Over the past 40 years, much work in sociology, psychology, marketing, and business has focused on proenvironmental behavior, investigating a range of interactions between humans and the environment. Many general theories of human behavior can contribute to understanding proenvironmental behavior. Early research into proenvironmental behavior aimed at persuading people to act in their own interest—maximizing their own personal utility (Ackerman 1997; Vining and Ebreo 1990). The importance of satisfying self-interest goals in eliciting proenvironmental behavior also stands at the core of equity theory (Adams 1963; Adams and Freedman 1976). Equity theory emphasizes fairness of relationship between input and output as the driver of behavior. Inputs are factors

perceived as personal investment, such as effort or cost needed to receive a return. An outcome is a return, which has utility or value for the individual. Outcome and input are compared as a ratio, taking into account their perceived importance. Following equity theory, proenvironmental behavior is more likely to occur when a person perceives a fair ratio between inputs and outputs. It implies that behavioral efforts should be compensated with a reward (Deci and Ryan 1985). Equity theory has not been used for intervention development in tourism to date, but appears to be highly suitable. Offering tourists rewards (increasing the output) may motivate them to improve their behavior (increasing their input) in return.

Studies emphasizing that leveraging a positive self-concept can trigger proenvironmental behavior used six major theories: the theory of planned behavior, attribution theory, social identity theory, cognitive dissonance theory, norm-activation theory, and value-belief-norm theory. The theory of planned behavior (Ajzen 1985) explains behavior as a consequence of attitudes, social norms and perceived behavioral control. This theory has been used heavily in studies of environmentally sustainable behavior in general, and specifically in tourism (e.g., Ong and Musa 2011). It predicts behavioral intentions well, but has been criticized because behavioral intentions do not necessarily translate into actual behavior (e.g., McKercher and Tse 2012). This theory may be suitable as a basis for intervention development if people are actually able to behave in the desired way (behavioral control), if their attitudes are in line with the desired behavior. We expect social norms to play a secondary role in the context of waiving hotel room cleaning because this is a behavior that remains invisible to people beyond the immediate travel party and a cleaner who does not represent a relevant other.

Attribution theory (Heider 1958) postulates that people either explain events as being caused by them (internally) or by external factors out of their control. When using internal attribution, people see themselves as the cause. When using external attribution, people see factors external to them as the cause. Attribution theory has been used in home and school contexts (e.g., Hudley, Graham, and Taylor 2007; Kua and Wong 2012), but not in tourism. It has potential, however, because attributing negative environmental consequences resulting from one's vacation to external factors is one of the excuses people use in their defense (Juvan and Dolnicar 2014). If an intervention could counteract such excuses by forcing tourists to revert to internal attribution, it may be harder for them to continue engaging in environmentally unfriendly behaviors.

Social identity theory (Tajfel 1979, 2010) views people's affiliation with certain social groups as well as their deliberate nonaffiliation with other groups as a key driver of behavior. A social-identity-based intervention has been successfully used by Baca-Motes et al. (2013) to increase hotel towel reuse. While the application of Baca-Motes et al.'s specific

intervention is unlikely to be adopted widely (because it requires hotel guests to wear a badge that is visible to other guests at all times), social identity theory offers many other alternative interventions which are less restrictive and therefore more suitable in the development of interventions aimed at having high uptake. We expect affiliation and nonaffiliation with groups to play a secondary role in our study because the wider visibility of the behavior of interest is low.

Cognitive dissonance theory (Festinger 1957) postulates that a lack of alignment of people's cognitions and behaviors leads to a tension referred to as cognitive dissonance. People can take one of two approaches in an attempt to relieve this tension: they can adjust beliefs or behaviors. Cognitive dissonance has been successfully used in inducing behavioral change, including reducing shower times at home (Dickerson et al. 1992), household energy consumption (Kantola, Syme, and Campbell 1984), and household water consumption (Aitken et al. 1994). In tourist behavior, cognitive dissonance has been observed (Hares, Dickinson, and Wilkes 2010; Miller et al. 2010; Juvan and Dolnicar 2014), but to date no empirical evidence has been provided demonstrating that it can be exploited to prevent people from adjusting beliefs thus—*theoretically*—left with no option but to change their behavior.

Norm-activation theory (Schwartz 1977) postulates that moral concerns play a major role in differentiating right from wrong and, as a consequence, eliciting environmentally friendly behavior. The norm-activation process is based on personal norms expressed as moral obligation toward the environment. Personal norms have a central position in norm-activation theory and function as mediator of situational and personality activators' influence on behavior (Harland, Staats, and Wilke 2007). Norm-activation theory has been tested and proven to work in a wide range of human prosocial behaviors including energy conservation (Black, Stern, and Elworth 1985), willingness to pay for environmental protection (Guagnano, Dietz, and Stern 1994), and shopping (Thøgersen 1999).

Stern's (2000) value-belief-norm theory of environmentalism postulates that proenvironmental behavior results from people's values and beliefs about the environment, their responsibility for the environment and personal norms. Two key levers for interventions can be used in an attempt to modify human behavior: awareness of consequences and ascription of responsibility. Both have been successfully manipulated in other contexts (e.g., Stern et al. 1999). Yet, value-belief-norm theory has never served as the basis of interventions aiming at changing *tourist* behavior, although both awareness of consequences and ascription of responsibility are known to play a role in triggering proenvironmental behavior in other contexts—specifically in the home context (Gössling et al. 2009; Miller et al. 2010; McKercher and Prideaux 2011). This theory is highly suitable for intervention development in the present study as it depends not on a social component, but rather only on the modification of two specific beliefs a tourist holds.

The interventions used in the present study are informed by equity theory, value-belief-norm theory, and attribution theory. These theories have proven effective in triggering proenvironmental behavior in the home context.

Tourists' Proenvironmental Behavior

Tourism research on proenvironmental behavior broadly falls into three categories: (1) the study of self-reported proenvironmental behavioral intentions or self-reported past proenvironmental behavior, (2) the analysis of purchases of environmentally friendly tourism products and services, and (3) the development of interventions to trigger proenvironmental behavior in tourists.

The first group—studying self-reported past behaviors or behavioral intentions—has produced the largest body of work. It is based on the assumption that behavioral intentions are good predictors of actual behavior, an assumption underlying one of the most popular theories of human behavior, the theory of planned behavior (Ajzen 1985). These studies cover a wide range of tourism contexts, including staying in eco-certified accommodation (Fairweather, Maslin, and Simmons 2005; Lee et al. 2010; Dalton, Lockington, and Baldock 2008), choosing environmentally friendly holiday transportation (Dawson et al. 2010; Prillwitz and Barr 2011; Hergesell and Dickinger 2013), voluntary carbon offsetting (MacKerron et al. 2009; Dawson et al. 2010; Mair 2011; Wehrli et al. 2011), avoidance of long-haul flights (McKercher et al. 2010), participation in green tourism activities (Dolnicar 2010; Wehrli et al. 2011; Lee 2011), producing less waste and using less water and energy (Shamsub and Lebel 2012; Barr et al. 2010), and engaging in conservation activities (Ballantyne, Packer, and Hughes 2009; Hughes 2013). The concern about studies of this nature is that what tourists say is not always what they actually do (Miller 2003; Kor and Mullan 2011).

The second group of studies uses some aspect of actually observed tourist behavior, such as purchasing certified environmentally friendly accommodation (Firth and Hing 1999), visiting environmentally friendly attractions (Higham, Carr, and Gael 2001; McKenna, Williams, and Cooper 2011), purchasing certified environmentally friendly tours (Wearing et al. 2002; Karlsson and Dolnicar 2016), and participating in sustainable activities at the destination (Weaver and Lawton 2002; Edwards and Griffin 2013). The advantage of this approach is that the behavior is captured more validly; the difficulty is that the particular behaviors studied may not in fact be valid indicators of environmentally sustainable behavior. For example, people can stay in an environmentally friendly accommodation because it is the only available accommodation option in a pristine nature area.

The third group of studies develops and empirically tests interventions aimed at triggering proenvironmental behavior in tourists. These studies use actual observed—rather than reported—proenvironmental behavior as the focal point:

mostly the use of hotel towels. Goldstein, Cialdini, and Griskevicius (2008) show that informing hotel guests about how many other people reuse hotel towels increases towel reuse by up to 14 percent. Mair and Bergin-Seers (2010) achieve a four percent increase in towel reuse through interventions combining information, norms and incentives. Baca-Motes et al. (2013) demonstrate that the act of tourists committing to a specific behavior—such as towel reuse—combined with a publicly visible sign of this commitment (badge) increased towel reuse by over 40 percent. The authors estimate that this intervention—per annum, in the hotel in which the study was conducted—would save 2,500 loads of laundry, \$51,000 and more than two million liters of water, concluding that “a small, carefully planned intervention can have a significant impact on behavior” (Baca-Motes et al. 2013, 1070).

It can be concluded from this review of prior work in the field of sustainable tourism that—methodologically—past studies of environmentally sustainable tourist behavior overwhelmingly relied on measuring proenvironmental attitudes or behavioral intentions, rather than actual behavior. But, as Miller (2003, 19) points out: “a weakness of much of this research is the distinction between what survey respondents say and what they actually ask for or do.” Actual behavior—which is what ultimately matters—is rarely measured.

The present study contributes to this body of work in four ways: (1) we study a different behavior (voluntary opting out of daily room cleaning), (2) we use observed behavior to assess the effectiveness of interventions, (3) the interventions we develop are informed by a number of theories of human behavior, and (4) interventions are designed in a way to minimize sacrifice on the part of the tourists as well as cost on the side of the hotel.

Methodology

A quasi-experimental field study was conducted in the four star rated Bohinj Eco Hotel in Slovenia. Bohinj Eco Hotel has 96 rooms and hosted 8,814 tourists in 2014. It is located in Bohinj, bordering Triglav National Park—one of the largest and most visited national parks in Slovenia. Bohinj Eco Hotel is dedicated to environmental and social sustainability. Built in 2009, it was equipped with the latest technological solutions to keep negative environmental impacts to a minimum and reduce operating costs. Bohinj Eco Hotel is Green Globe certified. Despite the hotel’s efforts on minimizing its environmental footprint, hotel guests do not choose this hotel because of its “green” credentials. It is chosen mostly because it is the more modern and well-equipped of only two hotels in the region, offering guests wellness and spa facilities, an à la carte restaurant, a bowling alley and a cinema area. Most hotel guests are from Slovenia, Italy, and Croatia. These markets have medium to high environmental awareness (European Commission 2008). There is no reason to believe, therefore, that the choice of this particular hotel as study site

negatively affects the generalizability of findings. If the hotel would be attracting particular environmentally friendly tourists, opting out of room cleaning rates would be expected to be higher and interventions used in this study more successful thus leading to upwardly biased results. We therefore expect findings to be generalizable to four-star hotels with a similar guest composition more generally.

Hotel guests were invited—in different ways—to voluntarily opt out of the daily room clean. Three alternative approaches were tested. The first approach (Study Group 1 = SG1) was based on equity theory and offered to share monetary savings of room clean opt outs with hotel guests. Specifically, for each voluntary opt out, each adult in the room received a voucher for a free drink at the hotel bar. The information provided to guests emphasized the balance of giving and taking: the hotel guest helps the hotel to save costs by opting out of a daily clean. The hotel, in turn, shares these cost savings by giving them one free drink for each adult in the room. The wording was as follows:

Not cleaning the room saves Bohinj Park ECO Hotel money. These savings are refunded to guests by providing them with complimentary drink vouchers for all adult guests for each time the room clean is waived. If you would like to opt out from cleaning on any given day, please just place the “no clean” door sign on the outside of your hotel door. The cleaner will then not clean the room and will slide one or more drink vouchers under your door. With each voucher you can get one free glass of wine, beer or non-alcoholic beverage at the hotel bar. We are happy to pass on the savings from not cleaning the room to you.

The second approach (SG2) was informed by Stern’s value-belief-norm theory of environmentalism as well as by attribution theory and used awareness of consequences and ascription of responsibility as levers to invite hotel guests to voluntarily opt out of daily room cleaning. In so doing, hotel guests were also directed to accept that they are in control of the behavior and that therefore internal attribution was appropriate. The wording was as follows:

The daily clean of a room has negative environmental impacts. It uses 1.5 kWh of electricity and 100 ml of chemicals which are released into the environment. With one billion tourists per year spending many billion nights in hotels, hotel room cleaning places a massive burden on the environment. Bohinj Park ECO Hotel cares about the environment. We therefore offer you to choose—every day—whether you want your room cleaned or not. You can make a difference. You can reduce the environmental burden of your stay by opting out of daily room cleaning. If you would like to opt out from cleaning on any given day, please just place the “no clean” door sign on the outside of your hotel door. The cleaner will then not clean the room. Please make a difference. Reduce the environmental burden of your hotel stay. Opt out of daily room cleaning.

Information about electricity and chemicals use included in this statement has been empirically determined at the hotel

in which the study was conducted using electricity meters and manual measurements of chemicals used. These values may differ from those in other four-star hotels.

The third approach (SG3) combined the other two approaches. In this combined approach, guests first saw the environmental argument, and then the sharing of cost savings information (see Figure S5 in the online Supplemental Materials). This order of presenting the arguments gave more weight to the environmental argument.

As can be seen in Figures S3, S4, and S5 in the online Supplemental Materials, each message was accompanied by a picture. The picture used to support the verbal sharing message was a handshake, and the picture used to support the verbal environmental message was a globe. The presence of these pictures on the information leaflets is in line with the study design.

All information materials came in four languages: English, German, Italian, and Slovene. Door signs and vouchers were professionally designed. The online Supplemental Materials contain all materials used in the study. All employees working at the reception, in the cleaning department, and in the food and beverage department were trained before the study was conducted. The same team of staff was on duty throughout the entire study period.

It is assumed that all three study conditions will lead to voluntary opting out and that the condition including both the equity-theory-based and the value-belief-norm-theory-and attribution-theory-based incentive will outperform the conditions where each of those incentives is offered in isolation. All interventions can be implemented by hotels using existing staff. Note, however, that successful interventions will lead to a reduced need for cleaning services. This potential social disadvantage is not the focus of the present study, which investigates the environmental consequences only.

Data were collected over a period of 21 days (August 3-23, 2015). It was necessary to implement the study conditions sequentially. Each condition started on a Monday and finished on a Sunday. Guests were exposed to only one study condition, and all guests staying during this time at the hotel were included in the study. Guests did not have the opportunity to opt-out of participation, implying a hypothetical response rate of 100 percent. The sampling design was by week, that is, guests checking in during the week where SG1 was running were assigned to this condition. July and August is the peak summer tourist season in Slovenia. The study was specifically conducted during this time to ensure minimal variation in guest composition across study conditions. The observed baseline opt-out rate from room cleaning during the peak season July and August is 2.5 percent (i.e., 2.5 of every 100 rooms are not cleaned at the request of the guest on any given day), indicating that without actively pointing guests to the possibility to waive their room clean this is a rarely used option. Even under standard operations of the hotel people can opt out because there is by default a sign in their room that they can use to indicate they do not wish for

their room to be cleaned. The baseline opt-out rate is known because the hotel records every room clean. Despite the best attempt to randomize the hotel guests captured, the comparison of the groups of guests in the different study conditions indicated that the guest compositions were not balanced across study groups regarding their sociodemographics; sociodemographics were therefore included as control variables in the analysis.

Approval for this study was granted by the university's human ethics committee. Hotel guests were informed by the receptionist—after having checked in—about the program. Once the receptionist felt that the guests had a good understanding of the program, they gave them an information package containing an information leaflet and a door sign that hotel guests were asked to use to indicate their voluntary opt out on any day during their stay. Note that the opt out occurred on a daily basis, so tourists had the option of putting the sign out for every day of their entire stay and opt out of all cleans or, for example, of opting out every second day. The possibility of opting out was not available for guests staying only for one day or on their last day of stay as rooms are always cleaned when guests leave. It is possible that some guests did not pay attention to the explanation by the receptionist, but it is reasonable to assume that tourists who do not pay attention are distributed evenly across study conditions, thus not biasing the comparative results.

Cleaners slid drink vouchers under the door and recorded room cleaning for each day and each room. Basic sociodemographic data (age, country of origin) for each registered guest and information about the stay in the hotel (number of adults in the room, number of children in the room, check-in and check-out dates, travel type—individual traveler, guest traveling with a tourist agency, and guests staying on special corporate rates) were obtained from the guest data base in deidentified form.

Descriptive statistics were used to summarize the data. A binomial logit model with random intercept was calculated for hypothesis testing to account for repeated measurements of guests staying for more than two days in the hotel. The model was fitted using maximum likelihood estimation with Laplace approximation for evaluating the likelihood (Bates et al. 2015). The dependent variable was if a room was cleaned or not. The independent variable was the study condition. In addition, the following control variables were included as regressors in the model: age of the registered hotel guest (the person paying the bill), the number of adults in the room, whether or not children were staying in the room, the total length of stay, the gender of the registered person (the person paying the bill), and travel type. This information was extracted from the hotel database in deidentified form together with the dates of stay and the room number to allow for matching with the room cleaning status. Asymptotic *z*-tests based on standard maximum likelihood estimation theory were employed to assess the significance of the regression coefficients. Model fit of regression models

Table 1. Descriptive Statistics by Guest Party for Each Study Group.

Variable	Statistic	SG1	SG2	SG3	χ^2	df	p
Age (years)	Mean	39.9	40.1	43.6	3.5	2	.171
	Standard deviation	12.9	13.7	13.3			
Length of stay (days)	Mean	3.2	4.6	4.3	28.5	2	<.001
	Standard deviation	1.8	2.9	2.8			
Number of adults, <i>n</i> (%)	One adult	53 (38)	23 (21)	21 (28)	6.0	2	.05
Number of children, <i>n</i> (%)	None	98 (72)	72 (64)	48 (64)	2.2	2	.34
Gender, <i>n</i> (%)	Male	93 (68)	97 (87)	68 (91)	20.6	2	<.001
Type of guest, <i>n</i> (%)	Travel agent	22 (16)	12 (11)	22 (29)	34.2	4	<.001
	Business	65 (47)	62 (55)	11 (15)			
	Individual	50 (36)	38 (34)	42 (56)			

with and without a random intercept is compared using information criteria (AIC, BIC) to assess the importance of the random effect. Pairwise comparisons between the estimated effects for each of the study conditions are performed with *p* values corrected for multiple testing using the single-step method (Hothorn, Bretz, and Westfall 2008). Additional models are considered using only the subset of the data consisting of the first day of stay of guests and using the complete data but including a control variable for the first day of stay.

While it would have been of great value to have additional background information about the guests (including a measure of the feelings the interventions induced in tourists) available for analysis, such additional information could not be collected because the hotel was concerned about not burdening guests more than necessary.

Results

In total 466 guest parties stayed at the hotel during the study. Guests who stayed only for one night were excluded from the subsequent analysis because they had no opportunity to opt out of room cleaning, reducing eligible stays to 324. Looking at the profile of the guests points the following picture: the average age of hotel guests registered for each of the 324 stays was 41 years; they stayed, on average, 3.9 nights; and 80 percent of guests identified as bill payers in the hotel database were male. In 65 percent of the stays two adults stayed in the room; in 30 percent of cases only one single adult. Two-thirds of guest parties did not stay in the hotel room with children, 19 percent had one child, and 13 percent two or more children. In terms of how the hotel was booked, 43 percent took advantage of a corporate rate (indicating they are business travelers), 40 percent were individual travelers, and 17 percent booked through a travel agent.

The distribution of hotel guest parties across study conditions was as follows: 137 (42 percent) were in SG1, 112 (35 percent) in SG2, and 75 (23 percent) in SG3. Descriptive statistics for the age of the registered guest, the length of stay, the number of adults and children in the guest party, the

gender of the registered guest, and if they were business travelers, individual travelers, or booked through a travel agent for each of the study groups are given in Table 1. The differences between groups are assessed using a Kruskal-Wallis test for the numeric variables and a χ^2 test for the categorical variables. The guest parties across study groups differ significantly with respect to length of stay, the number of adults, the gender of the registered guest, and the type of guest.

Given that opting out was not possible on the last night of every stay, converting stays into nights where it was actually possible to opt out of room cleaning (678 nights) leads to the following distribution across study conditions: 225 nights (33 percent) in SG1, 281 nights (41 percent) in SG2, and 172 nights (25 percent) in SG3.

Looking, descriptively only, at the extent to which hotel guest parties assigned to the three study groups opted out of the daily hotel room cleaning reveals a 41 percent opt-out rate for SG1, 16 percent for SG2, and 32 percent for SG3. These opt-out rates reflect aggregate observed rates and are determined by dividing the number of opt-outs by the number of nights stayed where opt-out was possible for each of the three study groups. These aggregate rates do not account for differences in length of stay of guest parties. Figure 1 provides a more detailed view with opt-out rates determined on guest party level and shows the distribution of opting out behavior across the three study conditions by guest party. The vertical axis shows how many percent of guest parties have shown a certain opting out behavior; the horizontal axis indicates the opt-out behavior, that is, the percentage of room cleans waived. For example, if a guest party never opted out, they are plotted in the bar labeled 0. If a guest party opted out every single day of their stay, they are plotted in the bar labeled 100. If a guest party opted out 40 percent of the possible days of their stay, they are plotted in the bar labeled 40.

A first interesting finding emerges from this initial descriptive analysis: many hotel guest parties never opt out and some opt out frequently, but the percentage of hotel guest parties who opt out only a few times is relatively low. This pattern emerges in all study conditions.

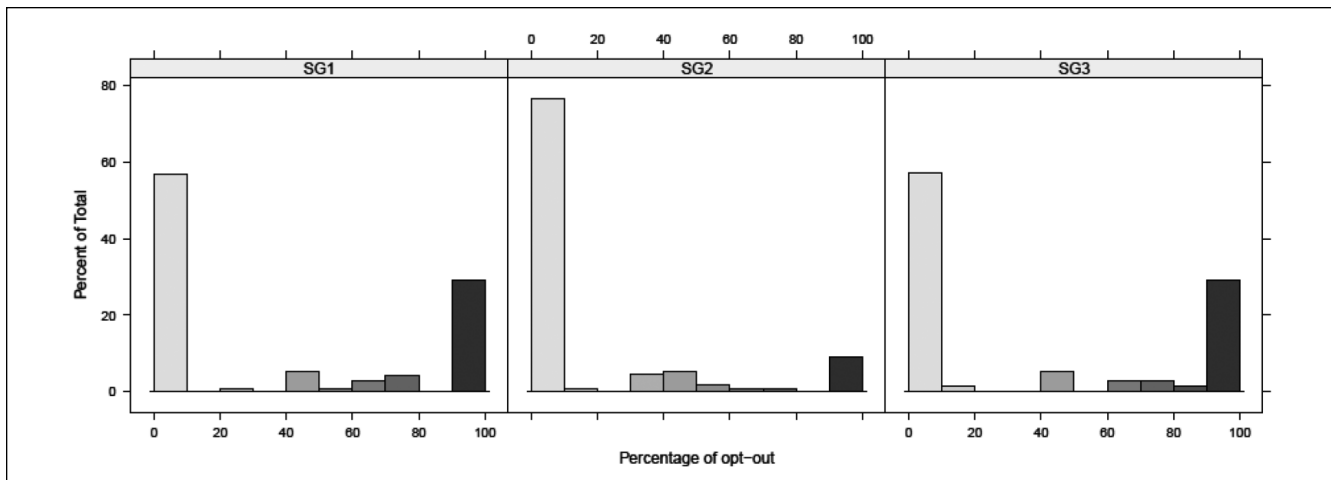


Figure 1. Frequency of opting out. Histograms of the percentage of opt out per guest party are given for each study group. The bars are colored from light gray to dark gray for the percentage ranging from 0 percent to 100 percent.

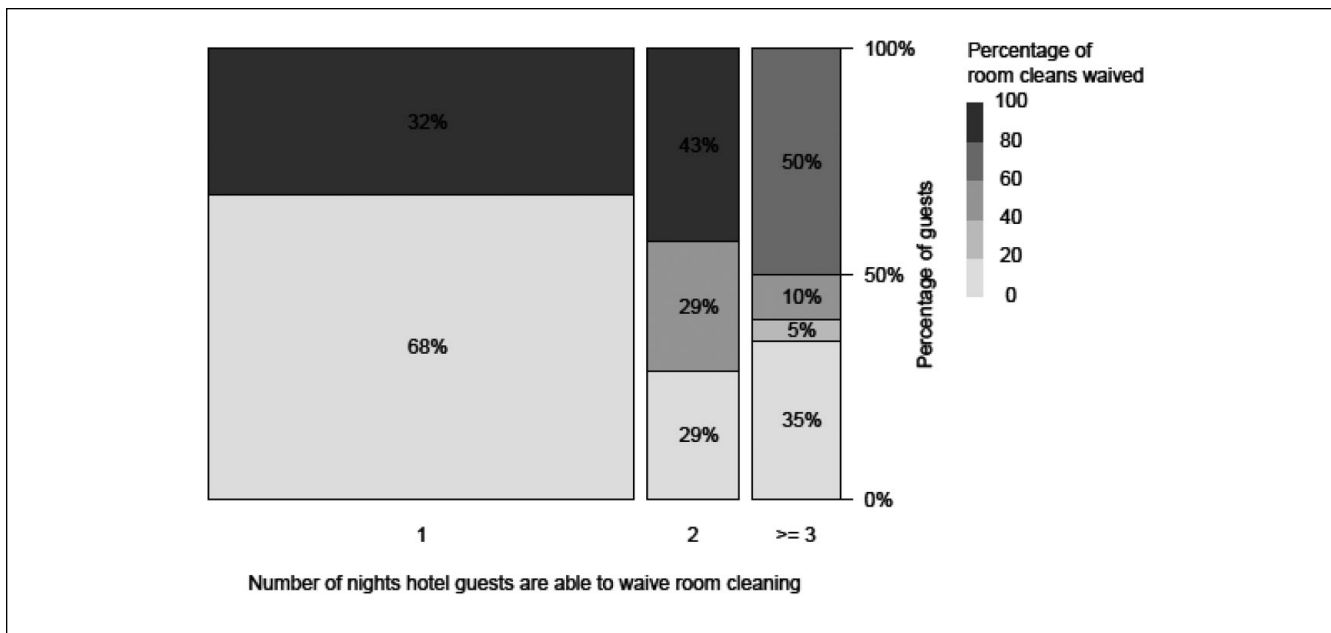


Figure 2. Percentage of opting out in dependence of nights with potential opt out for SG1. The rectangles are colored from light gray to dark gray for the percentage ranging from 0 percent to 100 percent. In addition, the percentages represented by each of the rectangles are shown inside the rectangles.

However, an interpretation of this figure is complicated by the fact that the majority of guest parties included in this analysis only had the opportunity to opt out of cleaning once because they only stayed for two nights. Information about the length of stay is not included in Figure 1. Therefore, an additional analysis was performed to investigate the proportion of opting out in dependence of the number of nights with potential of opting out. This analysis focuses only on SG1 where the highest proportion of opt-outs is observed. The results are shown in the spine plot in Figure 2.

Each of the three bars in Figure 2 represents a certain length of stay. The far left bar contains all guest parties who only had one opportunity to opt out because they only stayed at the hotel for two nights. The middle bar contains all guest parties who had two opportunities to opt out, and the far right bar contains all guest parties who had three or more opportunities to opt out of their daily room clean. The legend on the right shows that the lightest shade represents guest parties who chose never to opt out of the hotel room clean. The darkest shade of gray represents guest parties who opted out every single time they had the opportunity to do so.

As can be seen from Figure 2, 32 percent of guest parties who only had one opting out opportunity, did so; 68 percent preferred to have their room cleaned and did not accept the offer of obtaining a free drink. Among the guest parties who had two opting out opportunities three guest types seem to emerge: those who never opt out of room cleaning (29 percent), those who opt out once (29 percent), and those who always opt out (43 percent). This latter group disappears as the length of stay increases. None of the guest parties who had the opportunity to opt-out of room cleaning for three or more nights did so every time. However, the number of opt-outs is still quite high with half of these guest parties (50 percent) opting out between 60 percent and 80 percent of potential occasions from room cleaning. This is not altogether surprising; these guests appear to waive cleans they feel are not necessary while requesting cleaning when they feel it is needed.

A model-based analysis of the differences in opt-out behavior between study groups was performed using a random intercept binomial logit model. In this regression analysis the opt-out behavior on a single day is the dependent variable and the study group is the independent variable while accounting for repeated measurements of guest parties by a random intercept. The individual data for each day is used for analysis instead of a guest party-specific opt-out behavior measure to be able to take into account that the opt-out behavior cannot be equally reliably estimated for all guests because of their different length of stays. In addition, age, the number of adults and if children are part of the guest party, the length of stay, gender, and type of guest are included as control variables due to the differences in demographics of the guest parties between the study groups. The metric control variables age, number of adults, and length of stay were standardized before inclusion in the regression analysis.

The model with and without random intercept for guest party was fitted and compared using information criteria. The model including a random intercept provided a better fit (AIC = 707.1, BIC = 756.8) compared to the binomial logit model without random intercept (AIC = 779.8, BIC = 825.0). The estimate of the standard deviation of the random intercept was 2.9, indicating substantial differences in opt-out behavior tendencies between guest parties.

The random intercept binomial logit model relates the logit transformed marginal expected success probability to the linear predictor. Exponentiating the fitted coefficient estimates given in Table 2 thus gives the estimates of how the odds ratios of opting-out change if the covariate changes by one unit with the odds of opting-out being the ratio between the probability of opting-out divided by the probability of not opting-out. SG1 is used as baseline and is captured by the intercept. The regression coefficients for SG2 and SG3 therefore capture the difference in opting out from room cleaning in comparison to SG1. The coefficient estimate of -2.65 for SG2 gives the log odds ratio between

Table 2. Regression Coefficient Estimates, Their Standard Errors (SE), the z-Values and the p-Values.

	Estimate	SE	z	p
Intercept	-1.36	0.70	-1.94	.053
SG2 (communication only)	-2.65	0.69	-3.85	<.001
SG3 (both)	-0.94	0.66	-1.43	.151
Age	-0.16	0.25	-0.63	.530
Number of adults	0.27	0.26	1.03	.302
Children in the travel party	0.30	0.52	0.56	.573
Length of stay	0.21	0.26	0.82	.413
Gender (male)	0.95	0.64	1.49	.143
Booking type: Travel agent	-0.21	0.66	-0.32	.753
Booking type: Corporate rate	-1.24	0.62	-1.99	.047

SG2 and SG1 and thus indicates that the odds ratio between the two groups is 0.07; that is, the odds for opting-out of cleaning in SG2 are 93 percent lower than the odds in SG1. Pairwise comparisons of the effects of the study conditions indicate that SG1 and SG3 lead to significantly more opt-outs than SG2 and that differences between SG1 and SG3 are not significant, indicating that no additional effect of pointing to environmental impacts to increase the willingness to opt out of cleaning can be discerned (SG2-SG1: estimate = -2.65 , $p < .001$; SG3-SG1: estimate = -0.94 , $p = .32$; SG3-SG2: estimate = 1.71 , $p = .04$; p values are adjusted for multiple testing using the single-step method). As can be seen, SG2—which relies only on communication in an attempt to make hotel guests more aware of both the negative impact of daily hotel room cleaning as well as their ability to make a difference—leads to significantly lower levels of voluntary opting out from daily room cleaning than the two conditions which also offer hotel guests vouchers and emphasize the balanced give and take relationship between the hotel and the guests.

The regression coefficient estimates for the sociodemographics (age, gender, number of adults, and if children are in the room) used as control variables in the regression show that the only other significant factor is being a business traveler. Business travelers are—on average across all three study conditions—significantly less willing to waive the daily room clean. Age and gender, however, were available only for the person paying the bill and not for all people occupying a room. The person paying may not be the person deciding whether to have the room cleaned or not.

Two additional analyses were conducted: (1) using only the first day observations and fitting a binary logistic regression with only fixed effects and (2) using all observations and fitting a binary logistic regression with fixed effects and a random intercept and adding an interaction effect between first day of stay and study condition. Results using only the first day observations support the findings that SG2 leads to significantly fewer opt-outs than SG1 (SG2-SG1: estimate = -1.40 , $p < .001$; SG3-SG1: estimate = -0.66 , $p = .12$; SG3-SG2: estimate = 0.75 , $p = .09$; p values are adjusted for

multiple testing using the single-step method). Results for the model based on all observations where a main effect for the first day as well as an interaction effect between the first day and study conditions are included indicate that the interaction effect is not significant ($\chi^2 = 1.70$, $df = 2$, $p = .43$). This implies that the same effects are identified for the study conditions for the first day than for the other days: no voucher-induced reminder effects are occurring. Consequently, the interaction effect was dropped from the model. The model including only the main effect for first day shows that guests are more likely to opt out on their first day of stay (estimate = 1.32, $p < .001$). The main effects for the study conditions again indicate that SG2 leads to significantly fewer opt-outs than SG1 (SG2–SG1: estimate = -3.01 , $p < .001$; SG3–SG1: estimate = -1.08 , $p = .40$; SG3–SG2: estimate = 1.93, $p = .05$; p values are adjusted for multiple testing using the single-step method).

Conclusions and Implications

The following key contributions result from the present study: Most obviously, the interventions developed and tested that aim at changing tourist behavior to be more environmentally friendly showed substantial promise. Specifically, using equity-theory-based interventions, which emphasize the balanced relationship (Adams 1963; Adams and Freedman 1976) of the guest and the hotel in terms of their costs and benefits, proves to induce a substantial behavioral change in hotel guests in terms of voluntarily waiving their daily room cleaning service. In this study condition—which consisted of the specific appeal, but also the visual logo displayed on the information material—a 42 percent reduction of hotel room cleans that would have normally occurred was achieved. Every time a room is cleaned in the four star hotel in which the study was conducted 1.5 kWh of electricity and 100 ml of chemicals are used. Adopting the intervention widely therefore has substantial potential to contribute to a reduction of the environmental harm caused by tourism. The two study conditions based on equity theory (Adams 1963; Adams and Freedman 1976) were also found to outperform the intervention based on value-belief-norm theory of environmentalism (Stern 2000) and attribution theory (Heider 1958). This is an important finding because, currently, most hotels internationally rely on constructs from theories proven less successful in modifying human behavior in the present study: awareness of consequences and ascription of responsibility. Results from this study suggest that hotels, other tourism businesses as well as destinations wanting to trigger proenvironmental behavior in tourists should replace traditional appeals with messages that signal equity, fairness, or sharing of benefits between customer and provider. Note that adding awareness of consequences and ascription of responsibility (both communicating the environmental benefits of the behavior to be changed) to the economic equity conditions did not further increase uptake of the offer.

Second, the interventions developed are not expensive and not difficult to implement. It only takes a short conversation at check-in to explain to arriving guests how the model works, printing of materials (information flyer, drinks voucher, and “Please do not clean” sign), and providing the guests with vouchers. While the drinks are given away to guests for free, they do cost the hotel money. These costs are only half of the savings of not cleaning the hotel rooms because hotels purchase them at cost price. Ultimately, the hotel reduces costs if adopting the proposed scheme. As a consequence, the intervention that emerged as being the most successful in this study is indeed affordable to any accommodation provider whether small or big, rich or poor. Any hotel interested in reducing both operating cost and the environmental footprint of their operation can easily adopt the interventions. Destinations or any other tourism businesses could use this approach. All that is required is the adaptation of the intervention to the specific desired behavior.

Third, the present study provides empirical proof of the fact that interventions based on equity or sharing of benefits not only are appropriate for budget accommodation providers, but also can be effectively introduced in an accommodation offering higher quality of services. Some budget hotels have already implemented such measures, but in the opposite direction: to keep the price low, room cleaning is not included, but hotel guests can pay to opt in if they wish. The fact that the interventions were so successful in a four-star hotel was unexpected given that guests in high-end hotels have high expectations of the services provided and are less concerned about cost.

Fourth, the study showcases how an observed measure of behavior (the number of actual voluntary opt outs of daily room cleaning) that is less prone to human error or bias can be used as the dependent variable. Most studies of this kind still rely on (heavily biased) self-report measures. A small number have used towel reuse, but towel reuse, while an observed measure of behavior, is prone to counting and data entry error by cleaning staff.

Fifth, results from this study contribute directly to theory development by providing additional empirical support for the recent conclusions that appealing to the proenvironmental values of tourists fails to trigger more proenvironmental behavior in tourists (Dolnicar, Knezevic Cvelbar, and Grün 2017), a conclusion that stands in direct contrast to dominant theories of proenvironmental behavior in the home context (Bolderdijk et al. 2013; Evans et al. 2013).

Finally, this study demonstrates that taking small steps in changing tourist behavior can be an effective strategy in the process of improving the environmental sustainability of the tourism industry.

The study is limited by the fact that field testing occurred in one hotel in one country only. The study also does not represent a randomized experiment because the guests could not be randomly assigned to study conditions. Future work

should replicate this study in different destination settings, with hotels with different star ratings, and with hotels with different guest structures to assess the generalizability of results. Furthermore, the study did not collect any psychographic characteristics of the hotel guests, which may have provided some additional insights into how guests perceived the stimuli exposed to. In particular, more insights into the perception of the combined approach and the effect of the order of presentation of the two aspects might be of interest. Most important, however, this study opens up many future opportunities for similar quasi-experimental and experimental studies in tourism research with observed measures of changes in behavior as dependent variable and using a wide range of interventions developed on the basis of different psychological theories that have been shown to be effective in stimulating behavioral change in other contexts.

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Author Biographies

Sara Dolnicar is a professor of Tourism at The University of Queensland. Her primary research interest is the improvement of market segmentation methodology and of measures used in social science research.

Ljubica Knezevic Cvelbar is an associate professor of Tourism at the University of Ljubljana. Her research interests include sustainable tourism development and tourism economics.

Bettina Grün is an associate professor of Applied Statistics at the Johannes Kepler University Linz. Her research interest includes mixture models, statistical computing with R and quantitative marketing.