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Making Cool Choices for sustainability: Testing the effectiveness of a game-based approach to promoting pro-environmental behaviors

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ABSTRACT

Attempts to get people to reduce their carbon footprint have had mixed success at best, as many interventions focus primarily on increasing awareness or knowledge. Gamification has recently been used to break habits and induce enduring behavior change. Building upon this work, we designed a new game-based sustainability intervention and tested its effectiveness in two large-scale field studies (total $N = 1975$). In Study 1, playing our new sustainability game significantly reduced people's household electricity consumption six months after the game. In Study 2, playing the game led to increased self-reports of household efforts to save energy and perceived importance of sustainability. In both studies, high-energy consumers changed their environmental behaviors and attitudes the most. The research demonstrates that it is possible to induce a long-term change of habits in the sustainability domain. It also shows that neither attitude change nor conscious implementation intentions are necessary for behavior change.

1. Introduction

Mitigating climate change requires behavior change. More so than technological solutions, changing people's sustainability behaviors will generate long-term reductions in household energy usage – especially electricity – and thereby reductions in carbon emissions (Van Trijp, 2014). Although America in 2016 saw its lowest CO_2 emissions since 1991 (U.S. Energy Information Administration, 2016), total United States residential energy consumption remained disappointingly stable from 1980 to 2009 (U.S. Energy Information Administration, 2012). This stability is not surprising if one considers that most interventions increase awareness of sustainability issues but not actual adoption of pro-environmental behaviors. Besides, most campaigns are not empirically evaluated, and the few that are appear to be ineffective (Ignelzi et al., 2013). In order to fill this gap in the literature, we developed a game-based behavior intervention aimed at getting people to reduce their household energy consumption. The purpose of this paper is to provide empirical evidence for the effectiveness of this intervention.

1.1. Why so little behavior change?

There are multiple reasons for why so few people have adopted sustainable behaviors. First, a number of psychological barriers prevent behavior change. Although 45% of Americans in 2016 were "Alarmed" or "Concerned" about global warming, a significant portion of people were also "Disengaged" (7%), "Doubtful" (11%), or "Dismissive" (10%) with regards to global warming (Roser-Renouf, Maibach, Leiserowitz, & Rosenthal, 2016). Similarly, according to van der Linden (2015), many climate change issues are communicated to the general public with statistical numbers, which have "very little" meaning to most people. Many environmental problems do not have an immediate, discernable impact on people (Kollmuss & Agyeman, 2002). In fact, in their overview of psychological barriers to climate change action (e.g. ignorance, uncertainty, denial, rebound effect), Swim et al. (2009) note that most individuals tend to think about the short term and have difficulties imagining the benefits of long-term solutions. Even if people become invested in climate change problems, their environmental concerns often take a backseat to giving attention to their personal and social issues (Lorenzoni & Pidgeon, 2006). Finally, one of the

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"29 dragons of inaction" that prevent people from adopting sustainable behaviors is the fact that many people tend to perceive their sustainable behaviors as insignificant, thinking that their individual efforts will not matter overall (Gifford, 2011).

A second reason for the small adoption rate of sustainable behaviors is that so many campaigns do not put enough importance on measurable behavior change. Numerous past interventions have been based on one or more of the following principles: People will change their behaviors if they are made aware of the severity of the problem (awareness/attitudes), if they know what to do (knowledge/information), or if they realize that it is in their best interest to do so (self-interest/incentives, usually financial incentives). However, empirical studies have shown that these principles produce weak behavior change at best. Having a positive attitude toward energy conservation does not necessarily lead to behavior change (Costanzo, Archer, Aronson, & Pettigrew, 1986; Kollmuss & Agyeman, 2002). While awareness and environmental concern do predict pro-environmental behavior to a certain extent, the evidence for this relationship is mixed (Steg & Vlek, 2009; McKenzie-Mohr, 2011; but see; Brick & Lewis, 2014). Improving people's knowledge about sustainability or about how to consume less energy does not lead to an increase in pro-environmental behaviors (Kollmuss & Agyeman, 2002; see Abrahamse, Steg, Vlek, & Rothengatter, 2005, for a review). Although monetary rewards are sometimes effective in the short-term, people usually go right back to their initial behaviors as soon the financial incentives are removed (Abrahamse et al., 2005; Schwartz, Bruine de Bruin, Fischhoff, & Lave, 2015). Sometimes, monetary rewards even backfire and produce a boomerang effect (Asensio & Delmas, 2016).

According to Osbaldiston and Schott's (2012) review article, another sobering fact is that most existing behavior change campaigns cannot be empirically evaluated. In many cases, the campaign organizers collected no behavioral outcome measures. In other cases, they relied solely on self-reports, used samples that were too small, and/or failed to include an appropriate control group. Moreover, many of the organizers collected outcome measures immediately after the intervention, preventing them from determining whether their campaign had long-lasting effects. Osbaldiston and Schott concluded that since 1995, the number of published, quantitative work on household energy consumption has remained disappointingly low (see also Kormos & Gifford, 2014).

As an example that illustrates these issues, consider a recent initiative described in Reeves, Cummings, Scarborough, and Yeykelis (2015). These authors tested the effectiveness of *Power House*, a game in which players can perform energy-efficient behaviors (e.g. turning off appliances) in a virtual home. Although the authors collected data on actual energy consumption and observed a 2% reduction between pretest and posttest, the conclusions from this study remain tentative. Because the authors did not include a control group and failed to adjust for seasonal effects in energy consumption, we do not know whether playing the game caused the observed pretest-posttest difference. In addition, the posttest data were collected in the first 30 days after playing the game, therefore making it impossible to assess the long-term effects. Grossberg et al.'s (2015) report on 22 case studies of gamified sustainability campaign (which includes Power House) demonstrates these issues further: The overview did not present actual energy reduction numbers in most of the case studies, and only one intervention had a control group in its design. Not one intervention demonstrated long-term effects after the conclusion of the campaign (see Froehlich, 2015 for a similar review of gamified sustainability interventions). Nevertheless, despite their shortcomings, these studies are consistent with the claim we will make below: Gamification is an effective tool to change behaviors.

1.2. Effecting behavior change through gamification

Recent advances in the behavioral sciences have added numerous strategies that get people to break deeply engrained habits and adopt new behaviors (see Walton, 2014, for a review). Ignelzi et al. (2013) discuss recent contributions from fields as diverse as economics, psychology, anthropology, and sociology. In particular, gamification has gained significant traction as a method of producing attitude and behavior change in a variety of domains, including education, online communities and social networks, health and wellness (see Seaborn & Fels, 2015, for a review). Based on our overview of the scientific literature, we expected that gamification can also be leveraged to create an effective intervention in the sustainability domain. Below, we will first define gamification, and then discuss how elements of gaming in a sustainability intervention can lead to creating endurable changes in pro-environmental behaviors.

Incorporating gamification in behavioral change interventions refers to using elements of game design in real-life contexts such as the workplace (Deterding, Dixon, Khaled, & Nacke, 2011). Examples of game design elements include using points, levels, and badges to communicate the level of progression for the players whenever they engage in non-game activities (Seaborn & Fels, 2015). Use of these elements allows players to achieve a state of flow, or complete absorption to the task at hand (Huber & Hilty, 2015). In other words, gamification makes players become absorbed in doing non-game activities, and in our case, it motivates players to engage in sustainable actions.

The game elements reinforce this motivation by creating *competition* amongst the players. This is typically done through leaderboards that show which players are in the lead, thereby accessing their urge for competitiveness and providing extrinsic rewards. Competition has been widely incorporated in interventions aimed at decreasing energy usage of dorm residents in over 150 campuses, and these interventions are said to have achieved median reductions of 22% in energy use from students (Johnson et al., 2012). It is important to note, however, that when people are presented with a tangible reward, they believe that they are doing the behavior strictly for the reward, and not because they are inherently interested in it (Deci, Koestner, & Ryan, 1999). Similarly, Bem's (1972) self-perception theory suggests that people will attribute pro-environmental attitudes to themselves if they realize that they engaged in sustainable behaviors without tangible external reasons. This problem was showcased during Princeton University's 2014 'Do-It-in-the-Dark' campaign, which provided prizes to the winners of the competition as the main incentive: As soon as the competition ended, so did the behavior change (van der Linden, 2015). For this reason, game-based interventions should attribute relatively small rewards for doing the sustainable behaviors or reducing one's energy consumption.

A game-based intervention will likely create behavior change only if it allows for *normative influence* amongst players to occur. This can be achieved by splitting recipients of the intervention into teams that remain together for the duration of the intervention. Team members are often intrinsically motivated to conform to group norms. For example, an individual may begin recycling in order to fit in with other pro-environmental members of the team. Given that sustainability is valued in the context of the game, team members will try to outdo each other in order to show their commitment to reducing energy consumption. Slacking members

will be reminded of the contribution that is expected from them. In return, the team will provide positive feedback on the individuals' behaviors, causing individual members to have a sense of acceptance and to conform further to the group norm (Hamari & Koivisto, 2015).

Similarly, game elements also create opportunities for *social diffusion,* or the spreading of ideas or behaviors through examples set by similar members of the community. In the context of sustainability, the game should make energy-efficient actions visible to others, and reward the players for doing so through additional points. This can be achieved, for example, by exposing individuals to a photo of neighbors holding a pledge board or performing sustainable actions such as riding their bicycle to work. Social diffusion is especially important in the domain of household energy consumption where most sustainable behaviors are done in private. The more the desirable behaviors are made visible, the quicker they spread to other people (see McKenzie-Mohr, 2011, for a detailed review of the role of social diffusion in sustainability interventions).

In the sustainability domain, another advantage of using game elements is that it provides players with *concrete information* on how to change their energy consumption behaviors. A generic appeal to "reduce your energy consumption" is likely to be as ineffective as providing people with a to-do list of 100 behaviors that might easily be perceived as overwhelming. Often, people simply do not know what to do and where to start (Frantz & Mayer, 2009). An intervention is likely to be more effective if people receive specific, easy-to-understand instructions so that they know exactly which behaviors they should adopt (e.g., install a faucet aerator, limit your shower to 10 min; see Oskamp, 2000). Furthermore, people should receive a limited amount of instructions at a given time (Gardner & Stern, 2008). After a few sustainable behaviors are suggested to them, it is advised to wait a while and give people a chance to get used to performing these behaviors before new sustainable behaviors are proposed.

Moreover, gamification facilitates *habit formation*, or getting people to perform the pro-environmental behavior repeatedly. Studies within the health domain demonstrate that once a new behavior becomes a habit through repetition, the frequency in which people engage in the said behavior increases significantly (Phillips & Gardner, 2016). More importantly, habit formation leads to long-term behavioral maintenance even without the need for intentional motivation to maintain the said behavior (Judah, Gardner, & Aunger, 2013). Long-term behavior change will occur only if people perform the sustainable behaviors multiple times during the intervention. Gamification precisely addresses this issue by having players enter a state of flow, which intrinsically motivates the players to repeat sustainable actions.

Finally, by presenting the intervention in a game-like format, participants are provided with a *choice* about which sustainable behaviors they want to perform and which ones they want to adopt first. Choice increases people's intrinsic motivation (Patall, Cooper, & Robinson, 2008) and self-determination (Agran & Krupp, 2011). Choice is particularly important in the sustainability domain. There are many ways that someone can reduce their energy consumption but not everyone may be willing to or able to perform the same sustainable behaviors. Thus, a game-based sustainability intervention provides the opportunity for people to choose among several different energy efficient behaviors to engage in.

Staats, Harland, and Wilke (2004) designed a program (called EcoTeam) in which they implemented some of the elements of gaming that were described in the previous paragraphs. Participants were split into groups of 6–10 and met on a monthly basis to share their ideas on reducing energy and their experiences in engaging in specific pro-environmental behaviors. In addition, participants were given regular feedback on their progress. The researchers compared the electricity and gas consumption of the EcoTeam participants to that of a comparable subsample of the general population and found reliable differences in energy consumption two years after the conclusion of the program. As we will describe in the next section, the intervention we designed builds on this earlier initiative, but includes a larger number of elements of gaming, makes participation more fun, and thus requires less pre-existing motivation.

1.3. The Cool Choices game

Based on the above-mentioned literature on gamification and behavior change, we designed and implemented a social game that aims at getting individuals to reduce their household-level greenhouse gas emissions, including energy consumption. We will refer to the game as the "Cool Choices game" because it was implemented by Cool Choices, a non-profit organization located in Madison, Wisconsin. In the Cool Choices game, players compete in teams to gain points by claiming credit for their sustainable actions (details of the game will be presented in Study 1). The intervention includes all benefits of gamification mentioned above: It is framed as a game in which people can collect points, people play in teams (normative influence), and the teams compete for relatively small prizes (competition). During the game, people's environmental actions are made visible (social diffusion). Players collect points by validating cards on which very specific environmental behaviors are described (concrete information). The game contains so-called Step cards for which people can claim credit by performing certain behaviors repeatedly (habit formation). Finally, players can choose among several sustainable action cards made available to them at different stages of the game (choice).

In this paper, we evaluate the effectiveness of the Cool Choices game as a sustainability intervention that creates long-term changes in both pro-environmental attitudes and behaviors for the players. In Study 1, we showed that playing the Cool Choices game significantly decreased players' monthly electricity consumption, in comparison to a comparable control group. We did so by examining the players' electricity bills 6 months before and 6 months after playing the game (which itself also lasted 6 months). We show that the behavior change effects are highly persistent. In Study 2, we tested the effectiveness of the game with regard to a change in self-reported attitudes and habits. We show that players' card playing behavior during the game reliably predicts their attitudes and behaviors several months later. In addition, we examined a number of moderator variables to determine whether certain aspects of the game were particularly important and for which kind of individuals the game led to the biggest behavior changes.

2. Study 1

In Study 1, we tested whether the Cool Choices game effectively increased sustainable behaviors for the players. Specifically, we investigated whether playing the Cool Choices game reliably decreases the electricity usage of employees in a commercial construction firm with roughly 330 permanent employees based in five regional offices in Wisconsin. We accomplished this by comparing the reduction in electricity consumption of the players to that of the average resident in the same area. In addition, we conducted follow-up interviews with a sub-set of players to see if they had maintained their saving actions after the conclusion of the game.

2.1. Method

2.1.1. Participants

Two hundred and twenty employees participated in the game, which took place from May of academic year 1 to October of academic year 2 (6 months). All employees were initially assigned to one of seven teams based on organizational structure. Once employees knew the team they had been assigned to, they could decide whether they wanted to play or not, which is why teams (ranging from 44 to 58 per team) surpass the total number of 220 players. The leadership sent out emails encouraging employees to participate, but no one was forced to play. Among the employees who took part in the game, 100 signed a release form for the utility company, and of those individuals, sixty-six (24 women, 37 men, 5 unknown) provided complete electricity billing information from October of academic year 1 to May of academic year 2.[1] Analyses by Bensch (2013) suggest that the players from whom we had billing data resembled the broader population of players fairly well. The 66 players with utility data also resembled typical Wisconsin homes in electricity consumption, averaging about 10,000 kWh per year.

2.1.2. Intervention and procedure

Cool Choices is a game in which players claim credit for completing environmentally sustainable actions, and the players compete as a team to claim as much credit as possible. The actions are related to household electric usage, transportation, water usage, waste management and food choices, indoor environmental quality, and home heating. There are four categories of cards: 1) *Step Cards*: habitual actions that are repeatable each week a player completes them (e.g., *Bike to work one day/week*), 2) *Leap Cards*: actions a player can claim credit for only once (e.g., *Remove/unplug 2nd refrigerator*), 3) *Focus Cards*: an assessment of the player's current household sustainability (e.g., *Conduct an Indoor Environmental Quality assessment at your home*), and 4) *Innovation Cards*: imagining new sustainable solutions to everyday problems (e.g., *Develop a water-smart strategy for your outdoor watering needs*).

Each action was translated into points that players get for playing the corresponding card. Prior to the game, Cool Choices staff members determined the number of points for each card based on potential CO_2 savings and level difficulty of the action. In addition, the scoring was deliberately biased to encourage habitual actions; players quickly realized that there is an advantage to playing repeatable Step cards over and over, even though the point values are lower than Leap cards. Each Innovation card used by the players was evaluated by the Cool Choices staff and assigned a point value based on creativity and potential savings. Focus and Innovation cards changed from month to month during the game to match seasonal sustainability themes. Roughly 10–15 new cards were released each month. In total, 71 cards were released during the six months that the game lasted.

Players could claim credit for actions on a weekly basis by either submitting signed cards certifying completion of an action to Cool Choices staff or by clicking the appropriate card through an online interface that allowed users to claim credit for all active cards. We did not verify if the players actually engaged in the sustainable actions they claimed credit for. Players could also earn bonus points for sharing a photo associated with any action they took (so any step or leap card) or a team photo (see Supplementary Materials for examples). All player choices were recorded in a database and linked to a unique player ID.

In addition to the game framework – the specific actions for which players could claim points – the game website included a team and individual-based leaderboard, as well as photos and stories highlighting specific player successes. Within the leaderboard players could see a history of the actions claimed by other players. This public display of information fulfilled three purposes: First, leaderboards and points are important elements of gamification and increase players' motivation. Second, it allowed active players to "nudge" their less active team members. Third, it allowed players to verify to some extent if other players actually engaged in the actions they claimed credit for.

In April of academic year 1, the Cool Choices game was launched at a company-wide event with players joining the game through early May. Sign-ups occurred primarily through an online form where employees supplied their names and email information. Game play began May 1 of academic year 1 and lasted for six months. New players could join or drop out of the game at any time. The leadership at the company helped roll out the game by having a vice president introduce the game at an all-staff meeting. To encourage continued participation, prizes valued at $100, $75, and $50 were awarded to the top 3 individual point leaders at the end of each month. Additionally, every week between August and October, $25 prizes were randomly awarded to two players who claimed an action that week. Finally, four teams with the highest total amount of points at the end of the game were awarded the opportunity to direct charitable contributions ($2000 for first, $1500 for second, and $1000 for third and fourth place) to local organizations and individuals for sustainability-related projects.[2]

2.1.3. Outcome measures

In order to examine the long-term impact of the game on electricity usage, we analyzed the electricity bills of players 6 months prior to the start of the game and 6 months after the end of the game. More specifically, we calculated the average monthly electricity consumption of players from the beginning of October to the end of April of academic year 1 ("baseline consumption") and the average monthly electricity consumption from the beginning of October to the end of April of academic year 2 ("post-game consumption"), both measured in kWh. We then subtracted the post-game consumption from the baseline consumption to obtain an energy reduction score for each participant. Note that we compared two time periods that span the same months of the year, eliminating the need to control for seasonal variation in local temperature.

An examination of the energy usage data of the Wisconsin State Energy Office revealed that the residents who lived in the same geographical area as our Cool Choices players also reduced their energy consumption in the same period. In order to take these fluctuations into account, we first determined, for each player, the energy reduction of the average resident who received his/her electricity from the same utility company as the player under consideration. We then subtracted the energy reduction of the average resident from the energy reduction of the player to create a *reduction difference* score for each player. Larger values on this score indicate that the player reduced their energy consumption more than other residents in the area. Negative values indicate a smaller energy reduction than the average resident.

[1] Although all participants were asked to sign a release form, it took significant effort from players to do so: Employees had to take the release form home, find a copy of their utility bill and copy the account number, and then bring the signed release form back to work and submit it to the Cool Choices staff member. Players were asked multiple times to follow these steps, but the response rate remained low. Furthermore, the data could not be used in cases where the players moved during the timeframe, or the person who signed the release was not the person on file with the utility, or the account number did not match the utility records.

[2] For more details on the game, visit: https://coolchoices.com/.

Twelve to 13 months after the end of the game, an independent research firm contacted all players to solicit them for an in-depth interview. Among the 66 players, 45 could be reached one year later and agreed to be interviewed over the phone. Analyses by Bensch (2013) suggest that the interviewees resembled the broader population of players fairly well. The purpose of the interviews was to solicit more details about how they had implemented the sustainable actions and to examine the longevity of the behavior change effects. The interview focused on six specific "high-impact actions," i.e., actions that lead to the greatest reductions in energy savings (see Results section for a list of these six high-impact actions).

2.2. Results and discussion

We estimated a regression model in which we regressed the players' energy reduction difference score on their baseline consumption (mean-centered). Initial tests revealed that one player qualified as a statistical outlier and we removed this data point.[3] The analysis revealed two interesting effects. First, our central finding was that the intercept was statistically different from zero, $t(63) = 2.38$, $p = 0.02$, $\eta_p^2 = 0.08$. Players with average baseline consumption reduced their electricity usage by 26 kWh/month more than the average resident in their area. In other words, players saved, on average, 4% more electricity than the average resident. The Cool Choices game thus reliably reduced energy consumption of players who provided utility billing during the six-month period following the end of the game. Second, we also found that players' baseline consumption was positively related to their reduction difference score, $t(63) = 7.41$, $p < 0.001$, $\eta_p^2 = 0.47$, suggesting that players who consumed the most energy at baseline were also the ones who reduced their electricity usage the most after the Cool Choices game ended (see Fig. 1). Although this result may be due to a floor effect or to self-selection, we believe that it is promising because it suggests a behavioral change in high energy consumers, who often have the highest reluctance to change (Abrahamse et al., 2005; Young, 2013).

To examine the persistence of the effect, we computed players' energy reduction difference score for each of the 6 months that followed the end of the game. We then estimated a linear model in which we predicted players' monthly energy reduction difference score as a function of baseline consumption. The linear trend of month was non-significant, $t(63) = -0.11$.

$p = 0.91$, $\eta_p^2 = 0.00$, suggesting that players' tendency to reduce their energy consumption more than the average resident remained stable over time.

To explore this issue further, we regressed the players' energy reduction difference score of the final three months (i.e., based on months 4, 5, and 6 of the test periods before and after the game) on their in electricity consumption during the final three months of the baseline consumption (mean-centered). Results revealed that the reduction in energy consumption in the last three months was virtually identical to that of the entire six-month testing period, $t(63) = 2.42$, $p < 0.02$, $\eta_p^2 = 0.08$. Players reduced their energy consumption by 28.31 kWh more than the average resident, suggesting that the behavior changes persisted for at least six months after the game.

Note that the utility results have to be interpreted with caution because they only included data from the players who provided complete utility data. It is possible that this subset of players was more motivated from the outset than the other players. However, such an alternative interpretation can account for the results only if one assumes that the players who did not provide utility data actually increased their energy consumption, therefore eliminating the beneficial effect of the 66 players included in our analyses.

The interviews conducted 12–13 months after the end of the game revealed that behavioral persistence regarding six specific high-impact actions was generally high. If players changed their behaviors during the Cool Choices game (i.e., played the corresponding action card and indicated it was a new behavior), they were likely to continue to do that behavior one year later. Among the 17 players (out of 45) who had removed or unplugged a second refrigerator during the game, 15 maintained the action a year later (88%). All 15 interviewees who had claimed to switch their furnace fan from "on" to "automatic" during the game affirmed that the thermostat remained set that way at the time of the interview (100%). Seventeen players had claimed to turn off their gaming system when not in use during the game; among those, 12 continued to do so one year later (71%). Not surprisingly, the persistence rate was 100% with the other three high-impact actions that all involved a one-time behavior with long-lasting effects (replace 85 percent of incandescent bulbs with CFLs, replace water heater with more efficient model, and air seal and insulate to recommended levels). Although these findings have to be interpreted with caution because of the small sample size and the fact that they are based on self-reports, they nevertheless confirm the electricity consumption data reported above and suggest that our intervention produced persistent behavior changes.

3. Study 2

In Study 2, we tested the effectiveness of the Cool Choices game with three large samples. We focused on players' self-reports to assess whether behavior changes occurred. By including a baseline and a posttest questionnaire, we examined whether the Cool Choices game can also create significant attitude change along with behavior change in regard to sustainability. We also included the game data (i.e. number of cards played and the points and CO_2 savings associated with the cards) in our analysis. Finally, we ran a series of correlation analyses to identify the variables that predicted large behavior and attitude changes.

3.1. Method

3.1.1. Participants

For our analysis, we included 1909 employees from three companies (*N*s = 526, 137, and 1246) who provided data on at least one of the following: 1) the baseline sustainability questionnaire administered a week before the game, 2) cards used in the Cool Choices game and their associated points and energy savings, and 3) the posttest questionnaire administered a week after the conclusion of game. See the appendix for a complete breakdown on the distribution of data availability for the baseline questionnaire, cards used, and the post-test questionnaire across the three companies. Team organization varied in these three companies; in one firm, employees were assigned to teams, whereas in the other two organizations, employees formed their own teams. Team size ranged from 10 to 15 employees per team. The recruitment

[3] The player's reduction difference score was −233.07. According to Leys, Ley, Klein, Bernard, and Licata (2013), an observation considered an outlier if the score is smaller than *Md*-2.5**MAD* = −2.15−2.5*77.53 = −195.98, where Md is the median and MAD is median absolute deviation. The player's studentized residual was 2.92 (considered problematic if > 2.5), and his/her COVRATIO was 0.81 (considered problematic if < |3*P/N-1| = |3*2/66-1| = 0.91). When the outlier was included in the analyses, the intercept did not reach statistical significance, $b = 21.74$, $t(64) = 1.92$, $p = 0.059$, $\eta_p^2 = 0.05$. However, the relationship between players' baseline consumption and their reduction difference scores remained virtually unchanged, $b = 0.16$, $t(64) = 7.02$, $p < 0.001$, $\eta_p^2 = 0.43$. No other observation qualified as an outlier.

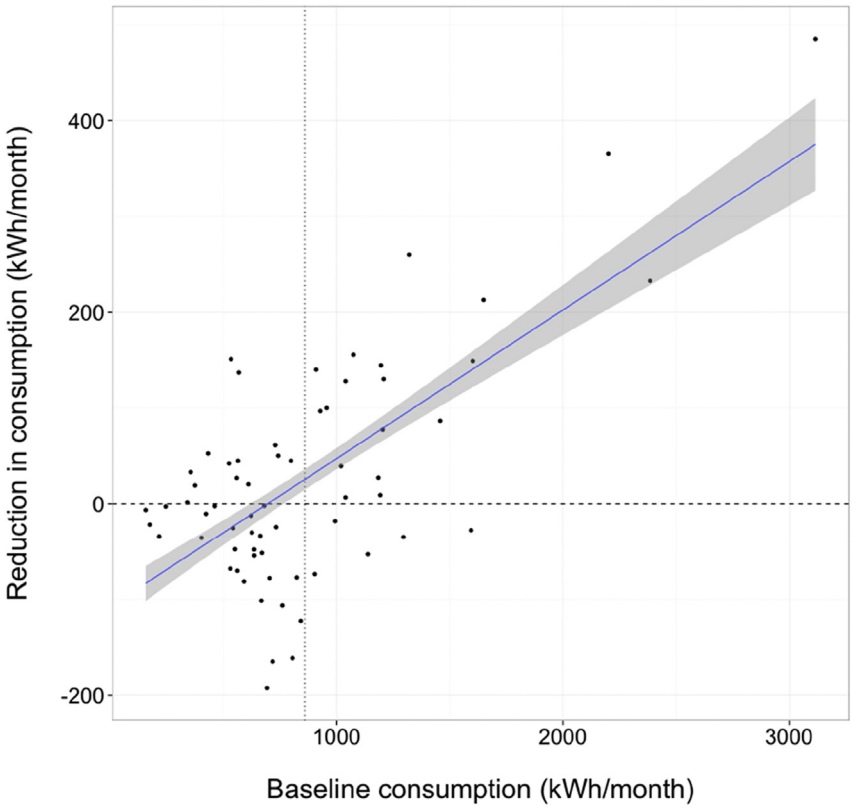

Fig. 1. Participants' energy reduction as a function of their baseline consumption in Study 1. The vertical line represents the mean baseline electricity consumption of the players.

procedure for the game was virtually identical to that in Study 1 and the same in all 3 companies. As before, playing the game was entirely voluntary for employees.

3.1.2. The baseline sustainability questionnaire

Prior to launching the Cool Choices game, employees across the three companies were administered a questionnaire that measured players' general attitude towards sustainability and climate change. The descriptive statistics of all measures are reported in Table 1. The items of all scales described below can be found in the Supplementary Materials.

3.1.2.1. Importance of sustainability. This scale consisted of two questions assessing the extent to which the employees perceive sustainability as a personally important issue. It included two items: *Sustainability is important to me* and *Sustainability is important to my household*. The end points of the 5-point Likert scales were labeled *Strongly Disagree* (1) and *Strongly Agree* (5). We averaged the items to create an importance of sustainability score ($\alpha = 0.89$).

3.1.2.2. Pro-environmental attitudes. This scale consisted of twelve questions assessing the extent to which the employees care about issues of sustainability and the environment. The scale included items such as: *It is worth it to me for my household to use less energy, in order to help preserve the environment.* The end points were labeled *Strongly Disagree* (1) and *Strongly Agree* (5). After reverse-coding the appropriate items, we averaged the items to produce a pro-environmental attitude score, in which higher values indicated that employees care more about environmental issues ($\alpha = 0.79$).

3.1.2.3. Household energy consumption. This scale consisted of four questions assessing employees' perceived household energy consumption relative to other similar households. Items included prompts such as: *How does your household compare to other similar households with regard to household energy (electricity, natural gas) usage?* The rating scale was labeled *We use more than others* (1), *We are similar to other households* (2), and *We use less than other households* (3). We reverse-coded all four items and averaged them to produce a composite score such that higher values indicate a greater perceived energy consumption ($\alpha = 0.66$).

3.1.2.4. Sustainable behaviors. This scale consisted of eight questions assessing the frequency with which the employees engage in environmentally friendly behavior. The measure included items such as: *Turn off unused office equipment.* The rating scales were labeled *Never* (1), *Rarely* (2), *Sometimes* (3), *Most of the time* (4), and *All of the time* (5). After reverse-coding the appropriate items, we averaged the items to produce a composite score in which higher values indicate a higher frequency of sustainable behaviors in employees' household ($\alpha = 0.55$).[4]

3.1.2.5. Number of people in the household. Finally, we asked the employees to provide the total number of people living in their household.

[4] Some of the scales have a Cronbach's alpha below 0.70. Note however, that an internal consistency level of alpha = 0.70 is an arbitrary cutoff point. "Although it would be nice to have a simple cookbook for measurement decision, there is no particular level of alpha that is necessary, adequate, or even desirable in all contexts." (John & Benet-Martinez, 2014, p. 480).

Table 1
Correlations between all measures in Study 2. The values below the diagonal are bivariate correlations, the values above the diagonal are partial correlations statistically controlling for company (as a categorical three-level variable).

Measures	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Importance of sustainability	4.34	0.81		**0.40***	**−0.26***	**0.34***	−0.06	**0.11**	0.08	**−0.11***	**0.34***	**−0.77***	0.12	0.11	**0.16***	**0.17***	0.00	0.04
2. Pro-environmental attitudes	3.98	0.55	**0.42***		**−0.30***	**0.39***	−0.02	0.01	0.01	**−0.12***	**0.32***	**−0.16***	**0.17***	0.05	**0.22***	**0.19***	−0.07	0.09
3. Household energy consumption	1.73	0.44	**−0.27***	**−0.32***		**−0.41***	**0.36***	−0.05	−0.02	**0.18***	**−0.14**	**0.18***	**0.15**	0.06	**−0.36***	**−0.20***	**0.26***	**0.14**
4. Sustainable behaviors	3.61	0.54	**0.34***	**0.42***	**−0.44***		**−0.13***	0.08	0.09	**−0.15***	**0.20***	**−0.22***	−0.05	0.08	**0.32***	**0.27***	**−0.13***	−0.04
5. # of people in the household	2.90	1.38	−0.06	−0.04	**0.37***	**−0.17***		**−0.10**	−0.04	0.03	−0.08	0.10	**0.14**	**0.20***	**−0.13**	−0.04	**0.11**	0.06
6. Cards played	71.34	41.06	**0.11**	−0.01	−0.03	0.01	-0.06		**0.88***	**0.30***	0.05	−0.04	**0.14***	**0.30**	0.06	**0.14***	0.07	**0.11***
7. Points earned	1172.83	752.74	0.08	−0.03	0.01	−0.01	0.01	**0.89***		**0.31***	**0.06**	0.00	**0.15***	**0.31***	**0.08**	**0.19***	0.07	**0.11***
8. CO_2 saved	1312.66	1760.03	**−0.10**	**−0.12**	**0.18***	**−0.17***	0.05	**0.33***	**0.34***		−0.03	0.08	**0.13***	**0.08**	**−0.23***	−0.02	**0.27***	**0.16***
9. Importance of sustainability	4.44	0.59	**0.35***	**0.33***	**−0.16**	**0.22***	-0.09	0.03	0.03	−0.04		**0.35***	**0.27***	**0.15***	**0.22***	**0.33***	0.02	**0.14***
10. Change in importance	0.09	0.55	**−0.76***	**−0.15**	**0.16**	**−0.17***	0.07	−0.09	−0.06	0.05	**0.35***		0.07	0.02	−0.07	0.05	0.10	0.06
11. Positive evaluation of CC	3.83	0.65	0.10	**0.14**	**0.17**	−0.08	**0.15**	**0.16***	**0.17***	**0.14***	**0.26***	0.06		**0.46***	**−0.21***	**0.14***	**0.40***	**0.70***
12. Talking about Cool Choices	2.72	1.01	0.10	0.02	0.08	0.03	**0.22***	**0.31***	**0.33***	**0.09**	**0.13***	0.00	**0.47***		-0.05	**0.26***	**0.31***	**0.33***
13. Effort in saving energy before	3.35	0.91	**0.17***	**0.25***	**−0.38***	**0.36***	**−0.15**	0.02	0.03	**−0.24***	**0.24***	−0.05	**−0.24***	**−0.08**		**0.62***	**−0.69***	**−0.27***
14. Effort in saving energy after	4.02	0.67	**0.17***	**0.19***	**−0.20***	**0.27***	-0.04	**0.13***	**0.16***	−0.03	**0.34***	0.06	**0.14***	**0.25***	**0.61***		**0.15***	0.06
15. Change in effort in saving	0.68	0.74	−0.01	−0.10	**0.28***	**−0.19***	**0.14**	**0.10**	**0.12**	**0.28***	0.00	0.08	**0.42***	**0.33***	**−0.70***	**0.14***		**0.40***
16. Turning off equipment	3.80	0.99	0.02	0.05	**0.17**	−0.10	0.08	**0.13***	**0.25***	**0.17***	**0.11***	0.04	**0.71***	**0.35***	**−0.30***	0.05	**0.42***	

Note: Measures 1–4 are from baseline questionnaire, measures 5–8 are from game data, and measures 9–16 are from post-test questionnaire. Bolded values indicate $p < 0.050$. Bolded values with * indicate $p < 0.010$.

3.1.3. *The Cool Choices game data*

The basic procedures of the Cool Choices game remained virtually unchanged, except for the fact that employees now played daily instead of weekly (see detailed description in Study 1). The design of the game was changed to daily reporting in order to better capture actions such as carpooling, and to increase overall accuracy of calculating points and savings. In addition, for each card they claimed credit for, players indicated whether it was a new action or an action they had been doing prior to the game. The gameplay lasted roughly two months for employees in the three participating companies (January 28 to April 19, 2013; June 3 to July 31, 2013; and July 8 to September 6, 2013). Playing the game was supported by various leaders in the companies (e.g., CEO, senior partner). The gameplay was extended for employees in the third company because the company decided halfway through the game to restart the team points as a strategy for getting the losing teams back in the game. Employees remained on the same team for the restart of the game. The descriptive statistics of the game data are reported in Table 1.

3.1.3.1. Cards played. We measured the total number of cards played by the employees during the Cool Choices game. As a reminder, playing a card means that the employee claimed that s/he had done the action described on the card. A list of the least and most played cards can be found in the Supplementary Materials.

3.1.3.2. Points earned. This measure consisted of the total number of points earned by the participant from playing the cards.

3.1.3.3. CO_2 saved. We computed the total estimated pounds of CO_2 saved by each participant from playing the cards and performing the corresponding sustainable actions. All of the saving estimates were annual savings as a function of playing the Cool Choices game. We considered only actions that players described as "new," i.e., behaviors that they did not engage in before the game.

3.1.4. *Outcome measures – post-test questionnaire*

One week after the completion of the game, players were administered a post-test questionnaire that measures players' self-reported changes in sustainable behaviors and attitudes towards climate change. The questionnaire had measures other than the four discussed below, but we limited our analysis to questions that gauge attitudinal and behavioral change from the game. Results from other measures did not reveal anything contrary to the measures included in our analysis. The descriptive statistics of the posttest measures included in our analyses are reported in Table 1.

3.1.4.1. Importance of sustainability. These items were identical to the items measured in the baseline questionnaire. Again, two items were used to create a sub-score of employees' perceived personal importance of sustainability ($\alpha = 0.81$).

3.1.4.2. Positive evaluation of the game. This scale consisted of seven items gauging employees' overall positive evaluation of the Cool Choices game. The scale included items such as: *I'm proud of the changes I've made as a result of playing Cool Choices*. The end points were labeled *Strongly Disagree* (1) and *Strongly Agree* (5). We averaged the items to create an overall score in which higher scores indicate that employees evaluated the game in a more positive manner ($\alpha = 0.82$).

3.1.4.3. Talking about Cool Choices. This scale consisted of two items measuring how often employees talked about Cool Choices with other people during the game. As an example, one of the two items was: *While the Cool Choices game was active, how often did you*

talk about sustainability at work? The rating scale was labeled *Never* (1), *Once or twice* (2), *Weekly* (3), *Several times per week* (4), and *Daily* (5). The two items were averaged to create a score on how often the participants talked about Cool Choices during the game ($\alpha = 0.72$).

3.1.4.4. Effort in saving energy. This scale consisted of six items measuring participant's self-reported household effort in saving energy relative to other similar households before playing the game (three items), and after playing the game (three items). The scale included items such as: *How much were you doing to save energy in your home before [since] Cool Choices?* The end points were labeled *Nothing* (1) and *A lot* (5). We averaged the items to create scores "household effort in saving energy" before ($\alpha = 0.83$) and after playing Cool Choices ($\alpha = 0.79$).

3.1.4.5. Turning off equipment. This scale consisted of two items measuring employees' self-reported likelihood of turning off equipment since playing the game. As an example, one of the two items was: *Since playing Cool Choices, I'm more likely to turn off lights in rooms at work that aren't being used*. The end points were labeled *Strongly Disagree* (1) and *Strongly Agree* (5). The two items were averaged to create a score of likelihood of turning off equipment since playing the game ($\alpha = 0.82$).

3.2. Results and discussion

3.2.1. Behavior and attitude change

To observe the impact of the Cool Choices game on players' self-report measures, we first calculated two change scores. The *change in importance* score was computed by subtracting employees' importance of sustainability score at pretest from their importance of sustainability score at posttest. Higher values indicate an increase in perceived importance. We also computed a *change in effort in saving* score by subtracting effort before playing the game from effort after playing the game. Higher values indicate that employees reported making more effort after than before the game.

We performed two one-sample t-tests to examine the pretest-posttest differences. Both change scores were reliably different from zero, suggesting that employees attributed more importance to sustainability, $M = 0.09$, $t(296) = 2.12$, $p = 0.02$, and made more household efforts to save energy, $M = 0.68$, $t(659) = 23.88$, $p < 0.001$, after playing the game. These results replicate Study 1, suggesting that people's energy-related behaviors were affected by the Cool Choices game. They also show that employees adopted more pro-environmental attitudes as a function of playing the game.

Among the 643 employees who provided an answer to the item "Since playing Cool Choices, I'm more likely to turn off lights in rooms at work that aren't being used" in the post-test questionnaire, 69% either agreed or strongly agreed. Similarly, 69% agreed or strongly agreed that since playing Cool Choices they were more likely to turn off unused office equipment ($N = 646$). On both of these questions, employees' ratings were reliably different from the scale midpoint (i.e., 3), $M = 3.82$, $t(642) = 18.43$, $p < 0.001$, and $M = 3.77$, $t(645) = 19.29$, $p < 0.001$.

In addition, based on the cards played by the employees and the corresponding sustainable actions they performed during the game, we computed how much energy the employees saved as a function of the game. As mentioned in the methods, we considered only actions that players did not engage in before the game. On average, each employee saved 1312.66 lbs. of CO_2 over a 12-month period. Broken down, each employee saved 442.01 kWh in electricity, 23.48 gallons of gas, 683.81 gallons of water, 6.56 therms of heat energy, 0.14 lbs. of waste, and 135.31 dollars ($N = 1361$ for all savings). In sum, these findings provide convergent evidence that the Cool Choices game successfully increased people's pro-environmental behaviors.

3.2.2. Correlation analyses

In order to examine the relationships between the different outcome measures, we ran a series of correlation analyses. We estimated both the bivariate correlations across all participants as well as the within-company correlations. We obtained the latter correlations by creating two orthogonal contrasts for the three companies (−1, 0, 1, and −1, 2, −1) and then computing the partial correlations while statistically controlling for the two contrasts. The correlation coefficients are reported in Table 1. In our presentation of the results we will focus on the bivariate correlations, which turned out to be quite similar to the within-company correlations. The correlation analyses reveal three major conclusions.

First, the greatest behavior changes occurred for those who consumed the most energy before the game. The more employees described themselves as high consumers who use more energy than other similar households, the more they played cards during the game that led to CO_2 savings, $r = 0.18$, the more they claim that they increased their household effort in saving energy, $r = 0.28$, and the more they say after the game that they are now more likely to turn off unused equipment, $r = 0.17$. These same employees also reported the largest increase in perceived importance of sustainability, $r = 0.16$. Finally, those with the least favorable pro-environmental attitudes at baseline were also the ones who saved the most CO_2 during the game, $r = -0.12$, and who reported the greatest increase in household effort in saving energy, $r = -0.10$. These findings make clear that the Cool Choices game does much more than merely preaching to the choir. It produces behavior change among the high consumers who *a priori* do not feel concerned about environmental issues.

Second, the social and gamification components seem to be key ingredients of the Cool Choices game. The more employees talked about the Cool Choices game to their team members, family members, and co-workers, the greater the behavior shift: Frequency of talking to others was related to number of cards played, $r = 0.31$, number of points earned, $r = 0.33$, and, most importantly, CO_2 saved, $r = 0.09$. It was also related to employees' posttest increase in household effort in saving energy, $r = 0.33$, and their posttest tendency to turn off unused equipment, $r = 0.35$.

Employees who positively evaluated the Cool Choices game played more cards during the game, $r = 0.16$, increased their household effort in saving energy, $r = 0.42$, and reported being more likely to turn off unused equipment, $r = 0.71$. Clearly, the size of the behavior shifts is affected by the extent to which the game stimulates discussion with others and the degree of enjoyment while playing the game.

Third, shifts in sustainable attitudes were not related to shifts in sustainable behaviors. Employees' shifts in perceived importance of sustainability between pretest and posttest were virtually uncorrelated with CO_2 saved, $r = 0.05$, the increase in household effort in saving energy, $r = 0.08$, or the likelihood of turning of unused equipment, $r = 0.04$ (see Table 1). Although one should interpret non-significant effects with caution, these null findings nevertheless suggest that a change in attitudes is not a prerequisite for a change in behaviors. Our data indicate that playing the Cool Choices game affects employees' attitudes and behaviors, but they provide no evidence for the idea that the behavioral changes are due to a change in attitudes or to a change in perceived importance

attributed to sustainability.

We also conducted a series of exploratory correlation analyses, which yielded several interesting results. For example, the larger the number of people in an employee's household, the higher the self-rated energy consumption (relative to similar others), $r = 0.37$, and the fewer the number of energy saving behaviors that family members engaged in, $r = -0.17$. Number of people in household was also related to frequency of talking to others about the game, $r = 0.22$, positive evaluation of the game, $r = 0.15$, and self-reported change in household effort in saving energy, $r = 0.14$. These results are consistent with the idea that the Cool Choices game gave employees the opportunity to communicate with the family members about sustainability and to suggest concrete actions to them. Clear guidance about which concrete behaviors to adopt may be seen as helpful when trying to get other family members to modify their habits, especially when families are large.

4. General discussion

The purpose of the research reported in this paper was to evaluate the effectiveness of a new sustainability intervention aimed at getting people to reduce the household energy consumption. In Study 1, employees who played the Cool Choices game reduced their energy consumption significantly more than members of a comparable control group over a six-month period. According to self-reports, the behavior effects persisted 12 months after the end of the game. In Study 2, playing the Cool Choices game led to increased self-reports of household efforts to save energy, replicating the findings of Study 1. In both Study 1 and 2, employees who consumed the highest amount of household energy prior to playing the Cool Choices game showed the greatest amount of behavior change.

One should note that the six-month delay of the effects of the intervention is much longer than the duration of monitoring of behaviors in a typical sustainability intervention (which is 2–8 weeks; see Osbaldiston & Schott, 2012). The longevity of the observed effects suggests that playing the Cool Choices game causes individuals to change their habitual behaviors regarding energy consumption. We believe that this change is due to the fact that the Cool Choices sustainability intervention utilizes game elements that have been shown to play a key role in behavior change. The intervention gamifies performing pro-environmental actions and introduces competition among players (competition). Team members encourage each other and exert social pressure (normative influence). The actions that players can claim points for are concrete and communicated progressively so as to avoid information overload (concrete information). People's environmental actions are made visible to other people so as to facilitate spreading (social diffusion). The fact that players can claim points for repeated actions encourages the formation of sustainable habits (habit formation). Finally, players are given the ability to choose the sustainable actions that they would like to engage in, thereby promoting self-determination and allowing people to choose actions that they find easiest to perform (choice). Indeed, games can be a powerful tool to change people's behaviors (Froehlich, 2015).

Our findings suggest that the biggest effects occurred for high energy consumers. Some studies show that sustainability interventions often do not seem to do much more than "preaching to the choir." In other words, they reach people who already engage in numerous sustainable behaviors but fail to affect those who can save huge amounts of energy by implementing a few minor changes (Haeri & Khawaja, 2012). Most social marketers insist on the necessity to choose a target audience of individuals who are ready to adopt new behaviors and whose behavior changes have the biggest impact overall (Lee & Kotler, 2015). According to the stages of change model (Prochaska & DiClemente, 1983), these are individuals who acknowledge the problem but have not yet taken any concrete steps to change their behavior (individuals in the so-called "contemplation stage"). The Innovation Diffusion model (Rogers, 2010) refers to these individuals as "late majority" or "laggards," i.e., individuals who jump on the bandwagon once a substantial proportion of their peers have adopted a new behavior. Our research suggests that in order to create substantial shifts in sustainable actions, a behavior change intervention must be able to reach beyond people who are already attitudinally and behaviorally invested in environmental issues, and create shifts in high consumers.

Our research also suggests new avenues for habit formation and overruling of old habits. Past literature has emphasized the role of intentions and conscious decision-making in creating new habits, especially if the new action must be performed across different contexts or in difficult situations (Ouellette & Wood, 1998). Similarly, maintenance of a behavior change is often attributed to implementation intentions, or a conscious planning of specific behaviors (Papies, Aarts, & de Vries, 2009). Based on our studies, however, we suggest that when habit formation is imbedded within a context of a social game, behavior change is possible without conscious formulation of implementation intentions. Furthermore, long-term effortful inhibition of old behaviors is likely to increase arousal of negative affect (Wood & Neal, 2007), which can be avoided through habit formation in the context of a game. Ouellette and Wood (1998) also conclude that behavior change should be immediately followed by some form of a positive outcome, and in social games, this is made possible by rewarding repeated sustainable actions with points and social recognition. Within the context of a game, players have social license to coach each other and exert pressures on slacking team members, which reinforces new behaviors in the short term and also helps with persistence.

Finally, our research findings complement earlier findings that testify to the weakness of the link between attitudes and behavior (Joule, Bernard, & Halimi-Falkowicz, 2008). Players changed their sustainable behaviors, but these changes were not correlated with changes in pro-environmental attitudes and importance attributed to sustainability. Although one should always interpret null effects with caution, our findings nevertheless suggest that attitude change seems to be neither a sufficient nor a necessary cause for behavior change. As mentioned earlier, the literature shows that even if people change their attitudes, behavior change is not guaranteed (i.e., attitude change is not a sufficient cause). Furthermore, the Cool Choices game does very little to directly change people's attitudes (i.e., no direct persuasive messages regarding energy saving behavior, or no new information about the severity of climate change). Thus, it is possible to get people to change their behaviors without first changing their attitudes. While it probably does not hurt to try to raise people's awareness, our research suggests that the sole focus of many interventions on changing people's beliefs and attitudes is a likely responsible for their limited effectiveness.

Although our studies provide empirical evidence for the effectiveness of our newly designed intervention, they are not without limitations. Admittedly, we had no random assignment to experimental conditions in Study 1, but instead used a "non-equivalent control group design." Cook and Campbell (1979) consider this design to be the best when random assignment is not feasible. Another shortcoming is that the sample size in Study 1 was

relatively small, but the analyses in Study 2 ($N = 1909$) closely replicated these findings both with card playing data collected during the game and self-reports collected after the intervention. Furthermore, our results of Study 1 should be taken with caution, as the reduction in electricity may in part be due to self-selection bias (i.e. those who provided utility data were more motivated to decrease energy consumption). Finally, while we believe all of the features of gamification are essential in successfully creating a shift in sustainable actions, we cannot draw any conclusions about their relative importance. And although our intervention contains the ingredients of the effective game-based interventions in the past, the surveys in Study 2 did not have formal manipulation checks on whether our game successfully implemented these ingredients (e.g. normative influence, social diffusion). Future research might attempt to test the effectiveness of the intervention while removing one feature at a time.

In September 2015, the Obama administration created the Social and Behavioral Science Team (SBST) to integrate research findings from the field of social sciences in their policy-making decisions. Among Social and Behavioral Science Team's 20 new projects planned for 2016 is "Addressing Energy- and Environment-Related Challenges" (The White House, 2015). The message is clear: Behavioral science is beginning to receive national and governmental attention as a potential solution to alleviating societal issues. The need for applying rigorous scientific methods in evaluating sustainability interventions is greater than ever. If national initiatives limit themselves to only increasing awareness rather than behavior change, and are not empirically evaluated, policy makers would not only fail to create significant reduction in energy usage, but also potentially waste millions of taxpayers' money. Significant changes in behavior will be possible only if behavioral intervention studies in the sustainability domain have appropriate designs that allow for empirical evaluation, assess long-term behavior change, and are based on current theories on behavior change.

The Cool Choices game has one additional advantage: It is eminently scalable. It can easily be implemented in organizations, schools, neighborhoods, and maybe even entire cities across the country. In Study 1, players reduced their monthly energy consumption by 26 kWh. If half of the American population reduced their energy consumption by 26 kWh per month for a year, this would lead to nearly 50 billion kWh in total savings, equivalent to a reduction of 34 million metric tons in CO_2 emission, or the removal of nine coal-fired power plants (U.S. Census Bureau, 2016; U.S. Environmental Protection Agency, 2016). When based on empirically tested theories in the social sciences, behavior change interventions are likely to be highly effective and to play a key role in mitigating climate change.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jenvp.2017.06.007.

Appendix

Number of employees who provided data for the baseline questionnaire, cards played during the game, and posttest questionnaire in the three organizations in Study 2.

#	Organizations	*N*	Baseline	Game	Post-test
1–108	Organization 1	109	X	X	X
109–229	Organization 1	121	X	X	
230–233	Organization 1	4	X		X
234–260	Organization 1	27		X	X
261–390	Organization 1	130	X		
391–449	Organization 1	59			X
450–525	Organization 1	76		X	
$N = 526$					
526–548	Organization 2	23	X	X	X
549–564	Organization 2	16	X	X	
565–573	Organization 2	9	X		X
574–582	Organization 2	9		X	X
583–626	Organization 2	44	X		
627–642	Organization 2	16			X
643–662	Organization 2	20		X	
$N = 137$					
663–814	Organization 3	152	X	X	X
815–913	Organization 3	99	X	X	
914–918	Organization 3	5	X		X
919–1151	Organization 3	233		X	X
1152–1352	Organization 3	201	X		
1353–1433	Organization 3	81			X
1434–1909	Organization 3	476		X	
$N = 1247$					
	All	284	X	X	X
	All	236	X	X	
	All	17	X		X
	All	269		X	X
	All	375	X		
	All	156			X
	All	572		X	
$N = 1909$					

Note. Due to a technical difficulty, it was not possible, for certain players, to establish a proper link between their responses to the baseline questionnaire, the game data, and their responses to the post-test questionnaire, meaning the total number of participants for each organization may be inflated. For example, a participant who filled out the baseline questionnaire only and another participant who filled out the post-test questionnaire only may actually be the same participant.

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