

Using Social Influence to Reduce Paper Towel Use in University Washrooms

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Abstract

A field experiment was conducted at Kwantlen Polytechnic University's (KPU) Surrey campus to reduce paper towel usage in washrooms. We conducted a pilot survey to address the barriers and benefits of individuals reducing their paper towel consumption and found that people were willing to reduce their paper towel usage but that one paper towel was inconvenient to dry one's hands. Our campaign aimed to address this and included a sign introducing the Shake and Fold technique to help increase the effectiveness of using a single sheet of paper towel and address this barrier. Additionally, a slogan accompanying the Shake and Fold instructions that targeted social influence was also present on the sign to increase its effectiveness. Results were not significant to determine if our sign had any effect on changing paper towel use habits. According to our pilot surveys, individuals saw value in reducing paper towel consumption, thus future research should continue to explore effective ways to reduce consumption.

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While using paper towels may be considered the most common and preferred method to dry one's hands, it is also regarded as unsustainable because people tend to consume more paper towels than they actually need (Haines et al., 2011). Our campaign to promote sustainable behaviour on campus, therefore, focused on reducing the amount of paper towels used by students in washrooms. We found this to be important because using paper towels is a rather frequent behaviour that we feel is abused on campus, as discussed in the "New Cintas Survey" (2017). We conducted a pilot survey which included 11 questions and 38 participants from near the washroom area to further understand how people feel towards reducing paper towel consumption, and to address the benefits and barriers of reducing paper towel usage. We predicted that targeting a behaviour such as this one could make a significant impact because it is so prevalent. We also projected penetration to be low; penetration refers to how many people already engage in a specific behaviour. We came to this conclusion because in our initial pilot surveys, many people stated that they felt the use of a single sheet of paper towel was not sufficient when drying their hands. We anticipated the probability of changing this behaviour to be high based on our survey and literature review findings. The impact of this behaviour change on the environment was also determined to be high, as behaviour change would reduce overall consumption of waste. The use of paper towels is a non-divisible behaviour, which means that the behaviour cannot be further simplified into smaller behaviours (McKenzie-Mohr, 2011). Reducing paper towel use can also be classified as an end-state behaviour which provides the actual behavioural change because reducing paper towel consumption has a direct effect on the environment as less of it is being consumed (McKenzie-Mohr, 2011). Considering these factors, we believed this to be an important and changeable behaviour.

Current Literature

To further understand the best way to change this behaviour, we conducted a literature review to gather information on behaviours regarding paper towel use and attitudes towards this particular method of hand drying. In general, people prefer using paper towels over other hand drying methods such as electric hand dryers (New Cintas Survey, 2017). Findings from a Cintas Survey conducted in 2017 demonstrated that the preference for using paper towels relates to its effectiveness and efficiency. Since convenience seems to be the main factor delineating why people prefer to use paper towels, when this variable was manipulated by

reducing the speed at which dispensers produce paper towels, people consumed less (Fox et al., 2019). To determine what else could affect paper towel use, we also looked at a study which found that the presence of recycling bins in the washrooms alongside garbage bins increased paper towel consumption (Catlin & Wang, 2013). It was concluded that people justified increased consumption because they were recycling their waste (Catlin & Wang, 2013). Based on these findings, it seems people are not willing to change this preferred hand drying method. Considering these barriers, we also sought out ways in which people can still engage in this behaviour but in a more sustainable way. We considered incorporating the “Shake and Fold,” a hand drying method that makes use of only one sheet of paper towel (Haines et al., 2011). The use of nudges—subtle pushes that can change behaviour—can also be effective as demonstrated by Haines et al. (2011), who found that when a sign demonstrating the Shake and Fold was posted on paper towel dispensers, 40% of people used only a single sheet of paper towel.

McKenzie-Mohr’s Approach

In order to change paper towel use on campus, we followed the approach of McKenzie-Mohr (2011) to fostering sustainable behaviour which involves five necessary steps. The first step is to select a behaviour to change, and the behaviour should be end-state and non-divisible. The second step, identifying behaviours and benefits, explains that before implementing a campaign it is necessary to understand why people are not already engaging in this behaviour. Identifying these can be done in a number of ways such as conducting literature reviews, observing those who engage and do not engage in the desired behaviour, using a focus group to gather more detailed information about the behaviour you are trying to change, and finally, using surveys to obtain attitudes and behaviours of your target population. Once this information has been gathered the next step, developing strategies, involves determining the best way to design a campaign to change the behaviour of interest. Developing strategies involves piloting the effectiveness of a campaign before implementing it on a broader scale. This will help identify possible issues that may arise when launching the actual campaign. Finally, broad-scale implementation and evaluation are when program application takes place and its effectiveness is analyzed. Although not all steps were incorporated into this study, such as piloting the intervention campaign, McKenzie-Mohr’s (2011), approach provided the framework for our campaign.

Pilot

Methods

We surveyed 38 students on the KPU Surrey campus to gather additional information on the barriers students may face when attempting to reduce the amount of paper towel they consume. Students were recruited near the washrooms we were going to examine during our baseline and experimental phases to increase the chance that the surveyed students were likely going to use these selected washrooms. The survey was conducted anonymously on paper with pen or pencil and each student completed the questions at their own pace. The survey had qualitative and quantitative questions which were focused on finding out why people prefer to use more than a single sheet of paper towel and how willing they would be to reduce consumption. The survey had 11 questions and took approximately 2-4 minutes to be filled out. Please see Appendix A for more information on our pilot survey. We found that a vast majority of respondents felt that a single sheet of paper towel was insufficient when it comes to drying their hands. Many also stated that they saw that there would be environmental benefits if they reduced their overall paper towel consumption.

Our barriers and benefits research from our pilot surveys indicated that the most significant barriers students projected facing when using only a single sheet of paper towel or reducing in general, was that it would not be effective in drying their hands. Introduction of the Shake and Fold technique breaks this barrier by introducing an effective way to use a single sheet of paper towel, without compromising its convenience. We felt that targeting social influence along with providing an effective method to reduce paper towel consumption would be successful in getting students to use less paper towels.

Results

The results of our pilot surveys indicated that 84.2% of respondents found one sheet of paper towel to be insufficient in hand-drying efficacy. Furthermore, 57.9% acknowledged that using one sheet would significantly reduce waste and 36.8% said it would help the environment. Responses to the close ended questions (as seen in Appendix A) also displayed that people find one sheet of paper towel to be insufficient but believed that there would be positive impacts on the environment by using a single sheet.

Discussion

The results of our pilot survey informed us as to where we may face problems when trying to get people to reduce their paper towel consumption. The most prevalent barrier people anticipated when using less paper towels was that using less, specifically only one sheet, would not be enough to dry their hands. However, people indicated that reducing their consumption would have a positive impact on the environment, they are in favour of making this change, and they think they would be able to reduce their consumption overall. Although many people indicated that they think waste reduction is important, they also admitted to using more than one sheet of paper towel to dry their hands. This is consistent with McKenzie-Mohr's (2011) conclusion that attitudes are not a strong predictor of behaviour. However, considering that people seemed willing and able to reduce their use, and they believed this will have a positive impact, we decided this change would be attainable. Specifically, since people indicated they believe they can change this behaviour it seemed likely that this behaviour could be changed (McKenzie-Mohr, 2011).

Our Campaign

Before implementing the campaign, we conducted a pilot survey to devise what our goals would be for the main campaign. The results of our pilot study indicated that people understand the value of reducing their paper towel consumption yet were not able to comply with these views as using one paper towel seemed insufficient to dry one's hands. With these findings, we decided that simply promoting the Shake and Fold may not be an effective way to get people to only use one sheet of paper towel. Therefore, we decided to also focus on how manipulating social influence can help change this behaviour. Our new research question for our campaign was changed to "Will targeting social influence lead people to use only one sheet of paper towel to dry their hands?".

Our campaign involved putting a sign on the paper towel dispensers in the washrooms at the KPU Surrey campus' Main building to influence people to reduce their paper towel consumption, ideally down to just a single sheet. The sign read "The students who use this washroom are willing to reduce the amount of paper towel they use...are you? Try the Shake & Fold!" (See Figure 1). This was accompanied by a visual on how to perform the Shake and Fold.

To get people to use only one sheet of paper towel, our campaign made use of social influence through the presentation of social norms, particularly injunctive, which provide the

basis for which behaviours are acceptable and those which are not, and descriptive norms which indicate behaviours most commonly used (McKenzie-Mohr, 2011). This was done by highlighting that the students who use our target washrooms are actually willing to reduce their paper towel use, making this seem like the most appropriate and commonly performed behaviour. Also, the Shake and Fold instructions demonstrate a descriptive norm by showcasing the desired behaviour. As indicated by McKenzie-Mohr (2011), descriptive norms that show the undesired behaviour may have a reverse effect and increase the undesirable behaviour instead of promoting the new behaviour. For this reason, our sign (see Figure 1) demonstrated the Shake and Fold technique, instead of someone overconsuming paper towels accompanied by a message deterring such a behaviour. Providing instructions on how to perform the Shake and Fold also addressed the barrier people thought they would face when using only one sheet by fully demonstrating how to use a single paper towel more effectively (McKenzie-Mohr, 2011). Speaking specifically to social norms and influence, a study by Goldstein, Griskevicius, and Cialdini as cited in McKenzie-Mohr (2011), demonstrated that if people think that others who are similar to them are also engaging in a behaviour, they are also likely to do so. This is why our sign indicated that “students in *this* washroom are willing to reduce the amount of paper towel they use.” We decided to target social influence as opposed to a knowledge-based slogan because providing information about an issue may not be enough to lead to behavioural change (McKenzie-Mohr, 2011).

Our signs also made effective use of prompts which are defined as a “visual or auditory [indicator] which reminds us to carry out an activity that we might otherwise forget” (McKenzie-Mohr, 2011). The signs were placed directly on paper towel dispensers, close to the target behaviour, to prompt people as soon the behaviour was about to take place. The simplicity and self-explanatory nature of our sign also made the behaviour easy to adopt; the step by step Shake and Fold instructions made it easy to understand and follow. Finally, our approach promoted a more sustainable method of use, instead of avoiding the consumption of paper towels altogether because people may be more likely to accept the change if they feel they have an element of choice.

Although our sign hit all the important elements of effective prompts, we also needed to ensure it communicated our message by being vivid, concrete, and personalized as suggested by McKenzie-Mohr (2011). Our information was vivid by using a bright green colour that

would stand out, and we used clear images to convey the instructions. It was personalized because it targeted not just KPU and its students, but KPU students in the specific washroom that the individual was in. This made it more interesting and specific to that population. Our message was also framed to demonstrate action rather than inaction, which is likely to be more persuasive (McKenzie-Mohr, 2011).

We incorporated all the elements mentioned in our message to get people to engage in problem-focused coping, which is more likely to lead people to take action (McKenzie-Mohr, 2011). We hoped that by informing people that other students are willing to make this change, while providing simple instructions on how to do so, it would be easy for them to make this change.

Main Study

The information gathered from our literature review helped determine the best way to reduce paper towel consumption. Overall, people seem to prefer paper towels to dry their hands for reasons such as it being more effective and convenient than other methods (“New Cintas Survey”, 2017). Therefore we did not try to influence them to use another method such as electric hand dryers because it seemed people would be unwilling to switch. The findings from Fox et al. (2019) also informed us of the importance of convenience and what motivates people to use paper towels over other methods. Considering these findings, we projected that incorporating the Shake and Fold method would not interfere with the convenience of using paper towels and would lead people to use less (see Haines et al., 2011). Based on our pilot survey results and literature reviews, we first hypothesized that the overall amount of paper towels used in the target washrooms would decrease from before our signs were posted until after we posted our signs. We also hypothesized that there would be fewer paper towels used in the washrooms with signs posted compared to washrooms without our signs posted during the treatment period.

Methods

The main study began with collecting data on paper towel use for our baseline, which took place in our first week of measurements. Four washrooms were selected from the KPU Surrey campus’ Main building. To ensure consistency, we selected washrooms that contained the same type of paper towel dispensers. Gender differences were not examined because we did not collect data on participants but instead focused on the amount of paper towel being used

overall. Data for paper towel usage was gathered and calculated by measuring the diameter of each roll so that we could observe any changes in overall paper towel roll volume between our measurement periods. In both women's washrooms, measurements were made on Tuesdays and Thursdays at 1:00p.m., 4:00p.m., and 7:00p.m. over three weeks. Measurements were made on Mondays and Tuesdays at 1:00p.m., 4:00p.m., and 7:00p.m. over three weeks in both men's washrooms.

The experimental condition immediately followed our baseline condition and took place over the course of the next two weeks. The signs read "The students who use this washroom are willing to reduce their paper towel usage...are you? Try the Shake & Fold!", which was accompanied by an image demonstrating the Shake and Fold technique (see Figure 1). Signs were posted directly on the paper towel dispensers to ensure they were visible. We posted signs in two different washrooms on the second floor of the Surrey Main Building, while the washrooms on the third floor were randomly assigned as control conditions and never received signs.

Results

For convenience and clarity, data on overall paper towel use was averaged across the two treatment weeks and average paper towel use per three-hour intervals for control and experimental conditions in each week is shown in Figure 2.

Baseline Versus Treatment Periods

To test the first hypothesis, a one-way analysis of variance (ANOVA) was conducted to evaluate if there was a significant difference in overall paper towel use before and after we posted our signs in just our experimental condition washrooms. The independent variable was the period of measurement: before having our signs posted (baseline) and after having our signs posted on paper towel dispensers (treatment). The dependent variable was the overall amount of paper towels used in a three-hour interval, and this value was calculated by finding differences in paper towel roll volumes at the beginning and end of each interval. We found no significant differences in overall paper towel use between baseline and treatment weeks, $F(1, 14) = 0.42, p = .53, \eta^2 = .03$. Table 1 shows the means, standard deviations, and 95% confidence intervals of the overall amount of paper towels used in a three-hour interval before and after our signs were posted in the experimental condition washrooms.

Control Versus Experimental Conditions

Another one-way ANOVA was conducted to evaluate the effects of posting our signs on overall paper towel usage over the course of the two treatment weeks. In this case, the independent variable was washroom conditions, where the control washrooms had no sign posted and the treatment washrooms had our sign posted on paper towel dispensers. The dependent variable was the overall amount of paper towels used in a three-hour interval. We found that there was no significant difference in overall paper towel use in washrooms that had our sign posted and washrooms that did not, $F(1, 18) = 0.24$, $p = .63$, $\eta^2 = .01$. Table 2 shows the means, standard deviations, and 95% confidence intervals of the overall amount of paper towels used in a three-hour interval in both washroom conditions.

Discussion

This experiment examined the effects of posting our sign onto paper towel dispensers in washrooms as a strategy to change paper towel usage. The results indicated that posting our signs did not decrease paper towel usage over the measurement periods and there were no significant differences between the experimental and control conditions.

As mentioned previously, the results of our pilot surveys revealed that students found it difficult to decrease paper towel consumption because just a single sheet was usually not enough to effectively dry their hands. Even though participants expressed that they were aware of the environmental benefits of reducing paper towel use, they did not want to give up the ability to fully dry their hands. The implementation of the Shake and Fold technique was intended to break this barrier by demonstrating an effective way to use a single paper towel, but the technique in itself could have introduced more barriers. For example, people may find that it is more convenient to use more than a single paper towel, rather than putting in the effort to shake off their hands and fold a sheet in half. Haines et al. (2011) found that presenting a sign demonstrating the Shake and Fold significantly increased the amount of people using only a single sheet of paper towel, so we hypothesized that our study would have a significant decrease in overall paper towel consumption. However, our findings were not consistent with the previous research: We found that the demonstration of the Shake and Fold did not produce any significant changes in our campaign.

The slogan we used on our signs was another avenue for us to influence behavioural change. We aimed to target social influence by presenting social norms because from our review of other literature, we believed this approach would be the most effective in influencing

our target behaviour. In a study which also examined the influence of targeting social norms, it was found that people are more likely to engage in pro-environmental behaviours when they believe others who are similar to them also engage in that particular behaviour (Goldstein et al., as cited in McKenzie-Mohr, 2011). Although our results were not consistent with those findings and our implementation of this concept did not produce any significant change, it is difficult for us to assume that targeting social norms was incorrect. The lack of significant results could be due to the developments of new barriers by our signs. In addition, our methods for obtaining data were not consistent with what had been conducted in other studies. Previous research obtained data on a per-participant basis as opposed to our method of measuring the volume of paper towels used in specific time frames and the limited time frame. If we had been able to run a longer campaign, we may have seen a difference.

We did not find any significant results from this study which could be used to implement any changes to washrooms at KPU. However, we do have general recommendations which could help reduce paper towel waste outside of what we found through our results. We found during our study that when replacing paper towel rolls, used paper towel rolls which had a lot of material remaining were being left on washroom counters for people to use. In the KPU restrooms we studied, paper towel dispensers had delays after dispensing each individual paper towel intended to reduce the level of convenience for consumers. By leaving leftover rolls on counters, it could lead people to use more than necessary. Perhaps this could be improved on by adjusting washroom cleaning schedules.

Limitations

Using the information from the surveys conducted, we projected people at KPU would be willing to reduce their paper towel consumption. As McKenzie-Mohr (2011) recommends, focus groups should be used to gather constructive feedback before implementing a strategy to identify additional barriers that may surface. However, we were unable to use focus groups before implementing our campaign due to lack of time and resources. McKenzie-Mohr (2011) also recommends pilot testing strategies to test the effectiveness of the proposed strategy to first determine how behaviour is impacted on a small scale. We were also unable to conduct a pilot test of our intervention campaign due to time constraints and limited resources which may have also influenced the effectiveness of our campaign.

There were various factors that could have emerged while conducting our field experiment which could have affected our end results. For example, there may have been reactance to our signs as it contained the question “are you?”, and that could have produced the opposite of our desired behaviour (McKenzie-Mohr, 2011). The potentially aggressive wording may have induced a resistant behaviour in some people. Another limiting factor we experienced occurred when paper towel rolls were replaced during measurement periods. In addition, the excess paper towel from the previous roll would be left on the counter, so we could not obtain accurate measurements in paper towel usage. This problem could have been alleviated if we had direct contact with custodial services at KPU, to help us coordinate around the times when paper towel rolls were changed. Lastly, systematic and human errors led to inaccuracy and inconsistency within our measurements and results. We measured paper towel usage over three-hour intervals so other factors such as the number of people using the washrooms within each interval could have had a significant influence on our results. Caitlin and Wang (2013) were able to get detailed measurements because they placed a counter outside the washrooms to see how many people used the washrooms versus how much paper towel was used, and this helped them understand the changes in paper towel usage per person. Also, the times of measurement were not the same for each washroom throughout our data collection periods. In this study, data on men’s washrooms were collected on Mondays and Tuesdays, whereas data on women’s washrooms were collected on Tuesdays and Thursdays. The difference in the days of the week could have affected our results as well. Human error was most prevalent in the measurements of data. When measuring the diameters of the paper towel rolls, we had to measure over the paper towel roll dispensers which resulted in lower precision in our measurements. A small difference in measured diameter could lead to larger differences in volume depending on the diameter length so this was a confound which was difficult to control. Finally, future research could consider using a different design and statistical analysis to test our hypothesis.

Summary

We determined that many people prefer using paper towels to dry their hands due to their convenience and drying effectiveness. However, we found primarily using paper towels is highly unsustainable compared to other hand drying options. Our goal in this study was to reduce paper towel usage in washrooms in the KPU Surrey campus’ Main building. We conducted literature reviews to understand the most effective ways in promoting a change in

behaviour (reducing paper towel usage) to help develop strategies for our campaign. The literature review was effective in narrowing down the most practical strategies to reach the desired behaviour, with social influence being a significant factor. We then conducted 38 pilot surveys near the washrooms to obtain a sample from a relevant demographic in the KPU Surrey campus' Main building to help us identify benefits and barriers. The results of the surveys indicated that people were willing to reduce their paper towel usage but identified that it would be difficult as one paper towel was insufficient at drying their hands. Acknowledging this barrier, the signs for our campaign presented an effective way to dry one's hands by using one paper towel: the Shake and Fold technique. The sign stated "KPU students in this washroom are willing to reduce their paper towel consumption... are you? Try the Shake & Fold!", followed by an image demonstrating the Shake and Fold technique.

Over the course of three weeks, we measured four different washrooms in the KPU Surrey Main building. Out of the four washrooms, two were randomly selected to have our signs posted so we could measure treatment effects. The baseline was measured in the first week and treatment effects were measured in the following two weeks. Paper towel rolls were measured in three-hour periods to observe changes. We found that our signs did not have a significant effect on overall paper towel usage within the washrooms we studied. This was found between both the baseline and treatment periods as well as between the control and experimental washrooms. However, in our pilot surveys, individuals recognized the value of reducing their paper towel consumption, therefore future studies should continue to explore effective ways to reduce consumption.

Figures and Tables



Figure 1. The Signs Posted on Paper Towel Dispensers in Experimental Washrooms During Treatment Weeks

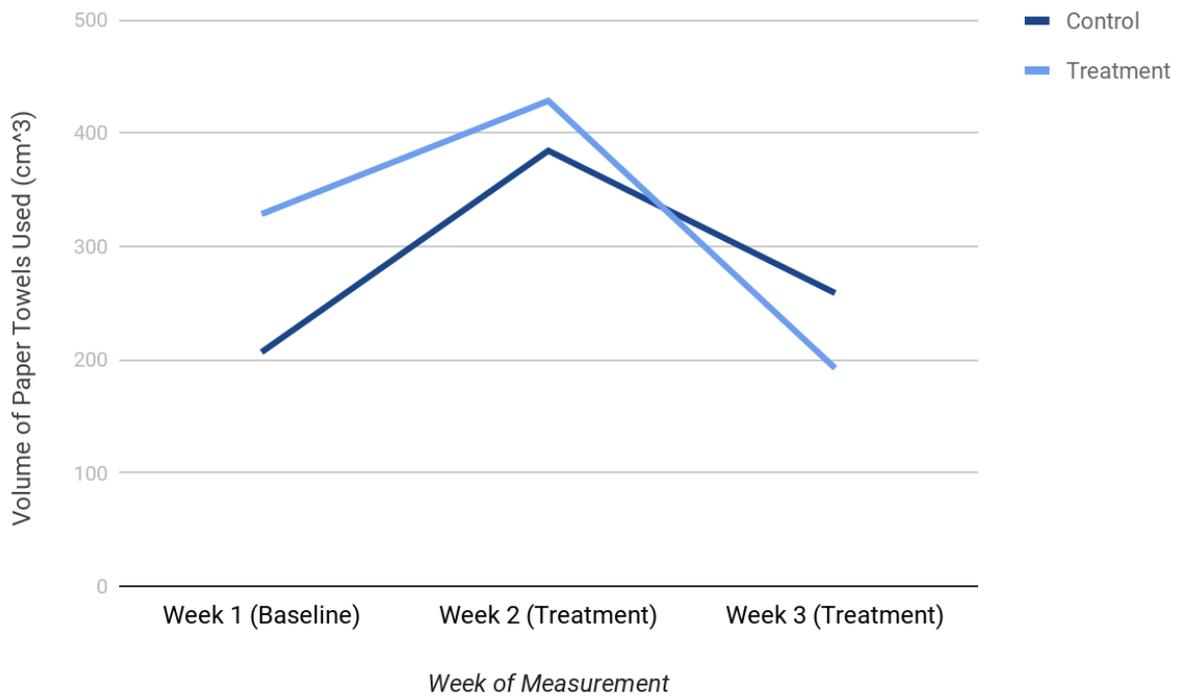


Figure 2. Average volume of paper towels used (cm³) during baseline and treatment weeks

Table 1

Means, Standard Deviations, and 95% Confidence Intervals for Overall Paper Towel Use (cm³) in Three-Hour Intervals within Experimental Washrooms During Baseline and Treatment Periods.

Measurement Period	Mean	Std. Deviation	95% Confidence Interval for Mean	
			Lower Bound	Upper Bound
Baseline (1 week)	328.36	186.37	156.00	500.73
Treatment (2 weeks)	271.13	167.00	142.77	399.50

Table 2

Means, Standard Deviations, and 95% Confidence Intervals for Overall Paper Towel Use (cm³) in Three-Hour Intervals Between Control and Experimental Washrooms During the Two Treatment Weeks.

Sign Condition	Mean	Std. Deviation	95% Confidence Interval for Mean	
			Lower Bound	Upper Bound
Control	304.48	135.94	213.16	395.81
Experimental	271.13	167.00	142.77	399.50

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