WEB APPENDIX A

MORE RESULTS OF DST NATURAL EXPERIMENT ON VARIETY SEEKING

We first report a placebo test and the robustness check on longer baselines for Study 1 in the main text, and then replicate Study 1 in the beer category.

Placebo Testfor Study 1[1]

We artificially define the first Sunday in March or the last Sunday in February as the DSTSunday. We compare these "fake" DSTSundays to their previous three weeks by performing the DiD analysis. Since the DSTSundays are not real in this case, we expect to find no significant effect for the interaction between $1(DSTSunday)$ and $PostPolicy$. The results are shown in the followingtable, which coincide with our expectation of not finding a significant effect. This supports the idea that the pre-DST trends are statistically equivalent before and after the policy change.

PLACEBO DiD REGRESSION OF NUMBER OF UPCs PER TRIP

Fake DST Sunday	Trips with quantity > 1		All trips	
	First Sunday in March	Last Sunday in February	First Sunday in March	Last Sunday in February
$1(DSTSunday)$ $\times PostPolicy$	-.28 (.17)	.15 (.14)	-.16 (.11)	.11 (.08)
Total quantity	.12*** (.02)	.12*** (.02)	.15*** (.01)	.15*** (.02)

Note: In all regressions, week of month, day of week, Sunday of month, year, and state dummies are controlled. *, **, and *** mean significance level at 10%, 5%, and 1%, respectively. Indiana and Arizona are excluded from the estimation. Standard errors are clustered at the state level.

Longer Baseline for Study 1

To test the robustness of the length of the baseline, we extend it to be four or five weeks before the DSTSunday. Analyses similar to those reported in Table 1A in the main text

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[1] An alternative design to test the DST effect is to compare the DST Sundays during 2004 - 2006 (i.e., the first Sunday of April) relative to 2007 - 2014. However, the presence of Easter Sunday near DST Sunday in April (i.e., the first Sunday of April is often close to Easter) introduces much noise from both the supply and demand sides to the model. Nevertheless, for completeness, we tried this analysis and found no significant effect.

were done, and the results are presented below. Only the key resultsare presented, i.e., the

interactions between $1(DSTSunday)$ and $PostPolicy$, which show no qualitative difference

relative to our main results in Table 1A.[2]

DiD REGRESSION OF NUMBER OF UPCs PER TRIP FOR LONGER BASELINE

Estimates of "$1(DSTSunday) \times PostPolicy$"	Trips with quantity > 1	All trips
Baseline: previous 4 weeks	.41** (.20)	.24** (.12)
Baseline: previous 5 weeks	.37* (.19)	.22* (.12)

Note: In all regressions, week of month, day of week, Sunday of month, year, and state dummies are controlled. *, **, and *** mean significance level at 10%, 5%, and 1%, respectively. Indiana and Arizona are excluded from the estimation. Standard errors are clustered at the state level.

Replication of Study 1 in the Beer Category

We replicate Study 1 in the main text in the beer category. Specifically, we examine

beer purchases from convenience stores and from restaurants (including pizzerias and quick-

serve restaurants) for off-premises consumption.[3] We believe this is an appropriate context to

test for variety seeking. There is typically a beer cooler or a beer section in convenience

stores, making it easy for consumers to quickly scan across a number of different beer UPCs.

And beer purchases from convenience stores are likely for imminent consumption. In

addition, the beer menu from restaurants provides an easy way to select for varieties.

The following table replicates the analysis of Table 1A in the main text. The results

are qualitatively the same as those in the main text, showing that consumers purchase a

greater quantity of different beer UPCs on DST Sundays compared to the previous three

weeks after controlling for the total quantity. This shows supportive evidence for our

hypothesis that sleepiness induced by DST leads to more variety seeking.

DIFFERENCE-IN-DIFFERENCE REGRESSION OF NUMBER OF UPCs PER TRIP FOR DSTSUNDAY

	Trips with quantity > 1	All trips

[2] We also extend the DST Sunday to include the following Monday (or the following week) with longer baseline (e.g., 4 or 5 weeks). Results are qualitatively the same as those in Table 1B.
[3] The Nielsen data only record purchases from restaurants for off-premises consumption.

1(DSTSunday) × PostPolicy	.24** (.12)	.09* (.05)
Quantity	.02*** (.004)	.03*** (.006)
# of observations	1940	5314

Note: In both regressions, week of month, day of week, Sunday of month, year, and state dummies are controlled. * and ** and *** mean significance level at 10%, 5%, and 1%, respectively. Indiana and Arizona are excluded from the estimation. Standard errors are clustered at the state level. The exact *p*-value for the estimate of 1(DSTSunday) × PostPolicy when only trips with quantity greater than 1 are used is .051.

The following table replicates the analysis of Table 1B in the main text. The results are qualitatively the same as those in the main text,showing that the effects decrease and mostly become nonsignificant (except for the effect with the following Monday and all shopping trips included) when the analysis extends to the following Monday, and weakens further for the following week.

DIFFERENCE-IN-DIFFERENCE REGRESSION OF NUMBER OF UPCs PER TRIP FOR DSTSUNDAY, FOLLOWING MONDAY, AND FOLLOWING WEEK

	Trips with quantity > 1	All trips
1(DSTSunday and the following Monday) × PostPolicy	.09 (.06)	.04* (.02)
1(DSTSunday and the following week) × PostPolicy	-.01 (.03)	.01 (.01)

Note: In all regressions, week of month, day of week, Sunday of month, year, and state dummies are controlled. * and ** and *** mean significance level at 10%, 5%, and 1%, respectively. Indiana and Arizona are excluded from the estimation. Standard errors are clustered at the state level.

The following table replicates the (placebo) analysis of Table 2 in the main text. The results are qualitatively the same as those in the main text, showing that the pre-DST trends before and after the DST policy change are not statistically different—a critical assumption of the DiD approach.

PLACEBO DiD REGRESSION OF NUMBER OF UPCs PER TRIP

	Trips with quantity > 1		All trips	
Fake DSTSunday	First Sunday in March	Last Sunday in February	First Sunday in March	Last Sunday in February
1(DSTSunday) × PostPolicy	.12 (.08)	.06 (.09)	.06 (.04)	.03 (.04)
Total quantity	.01*** (.004)	.01*** (.004)	.03*** (.01)	.03*** (.005)

Note: In all regressions, week of month, day of week, Sunday of month, year, and state dummies are controlled. * and ** and *** mean significance level at 10%, 5%, and 1%, respectively. Indiana and Arizona are excluded from the estimation. Standard errors are clustered at the state level.

The following table extends the baseline to be four or five weeks before the DST Sunday. The results are qualitatively the same as those using three weeks as the baseline, showing that the results are robust to the length of the baseline.

DiD REGRESSION OF NUMBER OF UPCs PER TRIP FOR LONGER BASELINE

Estimates of "$1(DSTSunday) \times PostPolicy$"	Trips with quantity > 1	All trips
Baseline: previous 4 weeks	.23** (.12)	.09* (.05)
Baseline: previous 5 weeks	.24** (.12)	.09* (.05)

Note: In all regressions, week of month, day of week, Sunday of month, year, and state dummies are controlled. * and ** and *** mean significance level at 10%, 5%, and 1%, respectively. Indiana and Arizona are excluded from the estimation. Standard errors are clustered at the state level.The exact p-values for the estimate of $1(DSTSunday) \times PostPolicy$ when the baseline is previous 4 and 5 weeks with only trips having quantity greater than 1 are .052 and .057, respectively.

In sum, the analysis of the beer category gives further support to our hypothesis that sleepiness leads to more variety seeking.
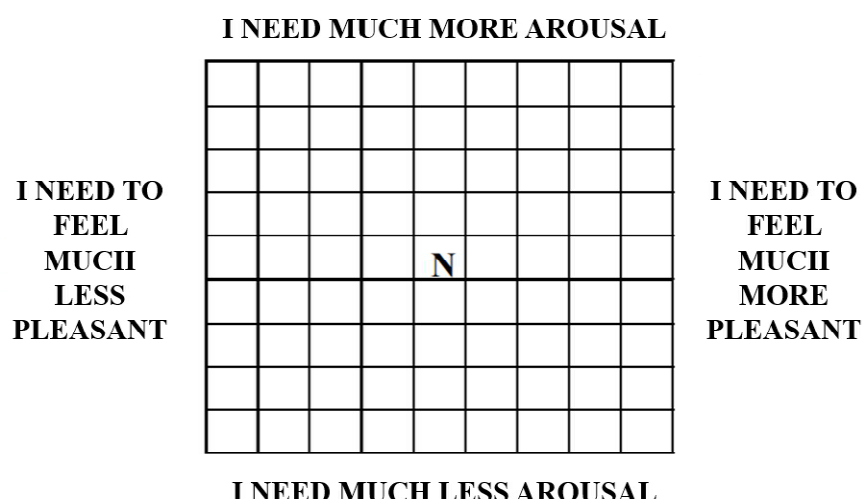
WEB APPENDIX B

*KEY MEASURES AND RESULTS RELATED TO SLEEPINESS, NEED FOR AROUSAL,
AND VARIETY SEEKING IN STUDIES 2–5*

1. **Measure of Sleepiness Used in Studies 2–5 (Stanford Sleepiness Scale; Hoddes, Zarcone, and Dement 1972)**

Using the 7-point scale, please indicate how sleepy or awake you are feeling at this moment. (1 = "Feeling active, vital, alert, or wide awake" and 7 = "No longer fighting sleep, sleep onset soon; having dream-like thoughts").

2. **Affect Grid Used in Studies 3–5**

I NEED MUCH MORE AROUSAL

I NEED TO FEEL MUCII LESS PLEASANT

N

I NEED TO FEEL MUCII MORE PLEASANT

I NEED MUCH LESS AROUSAL

N = Your Current State

3. **Summary of Key Measures and Results in Study 2**

(1) Key measures involved:
   (a) Chronotype (Smith, Reilly, and Midkiff 1989)
   (b) Sleepiness (Stanford Sleepiness Scale; Hoddes, Zarcone, and Dement 1972)
   (c) Variety seeking: Variety in actual choice of three candy bars out of four options

(2) Results
   (a) Effects of time of day and chronotype on sleepiness (manipulation check) and actual variety seeking in candy bars

	Sleepiness (manipulation check)	Actual variety seeking in candy bars
Time of day	.15 (.17)	-.05 (.08)
Chronotype	-.02* (.01)	-.0003 (.01)
Time of day × chronotype	.18**** (.02)	.05**** (.01)

(b) Simple effects of chronotype on sleepiness (manipulation check) and actual variety seeking in candy bars at different levels of time of day (morning vs. evening)

	Sleepiness (manipulation check)	Actual variety seeking in candy bars
Simple effect of chronotype in the morning	-.12**** (.02)	-.03**** (.01)
Simple effect of chronotype in the evening	.06**** (.02)	.02**** (.01)

(c) Correlation between sleepiness and actual variety seeking in candy bars: r(297) = .30****

Note: For regression and correlation coefficients of Study 2,*$p< .05$, **$p< .01$, ***$p< .005$, ****$p< .001$. Standard errors are in parentheses.

4. Summary of Key Measures and Results in Study 3a

(1) Key measures involved:
  (a) Sleepiness (Stanford Sleepiness Scale)
  (b) Need for arousal (measured after the manipulation of relaxation instruction)
  (c) Variety seeking: Variety in actual choice of four candies out of five flavors

(2) Results
  (a) Effects of sleepiness and relaxation instruction on need for arousal and actual variety seeking in candy flavors

	Need for arousal	Actual variety seeking in candy flavors
Sleepiness	.24** (.09)	.03 (.05)
Relaxation instruction	-.35 (.25)	-.11 (.13)
Sleepiness × relaxation instruction	-.93**** (.18)	-.19* (.09)

(b) Simple effects of sleepiness on need for arousal and actual variety seeking in candy flavors in the no-instruction and relaxation-instruction conditions

	Need for arousal	Actual variety seeking in candy flavors
Simple effect of sleepiness in the no-instruction condition	.71**** (.12)	.12* (.06)
Simple effect of sleepiness in the relaxation-instruction condition	-.22 (.13)	-.06 (.07)

Note:For regression and correlation coefficients of Study 3a, *$p< .05$, **$p< .01$, ***$p< .005$, ****$p< .001$. Standard errors are in parentheses.

5. Summary of Key Measures and Results in Study 3b

(1) Key measures involved:
    (a) Sleepiness (Stanford Sleepiness Scale)
    (b) Variety seeking: Variety in actual choice of four gift cards as lucky draw prizes out of five options

(2) Results
    (a) Effect of sleepiness and sound manipulation on actual variety seeking in gift cards

	Actual variety seeking in gift cards
Sleepiness	.08* (.04)
Sound	-.29* (.13)
Sleepiness × sound	-.30**** (.08)

    (b) Simple effects of sleepiness on actual variety seeking in gift cards in the no-sound and stimulating-sound conditions

	Actual variety seeking in gift cards
Simple effect of sleepiness in the no-sound condition	.22**** (.05)
Simple effect of sleepiness in the stimulating-sound condition	-.07 (.06)

Note: For regression and correlation coefficients of Study 3b, *p< .05, **p< .01, ***p< .005, ****p< .001. Standard errors are in parentheses.

6. Summary of Key Measures and Results in Study 4

(1) Key measures involved:
    (a) Sleepiness (Stanford Sleepiness Scale; assessed pre-choice and post-choice)
    (b) Need for arousal (assessed pre-choice and post-choice)
    (c) Variety seeking (only in the variety choice task condition): Variety in actual choice of three sticky notes out of four colors

(2) Results

Correlations between sleepiness and need for arousal as well as actual variety seeking in sticky notes

    (a) Pre-choice

	Need for arousal (pre-choice)	Actual variety seeking in sticky notes
Sleepiness (pre-choice)	.34****	.29***

    (b) Post-choice

	Need for arousal (post-choice)	Actual variety seeking in sticky notes
Sleepiness (post-choice)	.30****	.18*

Note: Numbers in this table are correlation coefficients. *p< .05, **p< .01, ***p< .005, ****p< .001.

7. Summary of Key Measures and Results in Study 5

(1) Key measures involved:
  (a) Sleepiness (Stanford Sleepiness Scale)
  (b) Need for arousal
  (c) Variety seeking: Variety in actual choice of four candies out of five flavors (containing one novel but less positive flavor and four other less novel but more positive flavors)

(2) Results

Effects of sleepiness on need for arousal and actual variety seeking in candy flavors (correlations)

	Need for arousal	Actual choice of the novel, less positive flavor	Actual choice of the less novel, more positive flavors	Total actual variety seeking in candy flavors
Sleepiness	.38****	.19***	.18***	.26****

Note: Numbers in this table are correlation coefficients. *$p< .05$, **$p< .01$, ***$p< .005$, ****$p< .001$.

WEB APPENDIX C

ADDITIONAL RESULTS ON NEED FOR AROUSAL AND NEED FOR PLEASANT

FEELINGS IN STUDY 3B

In Study 3b, participants responded to the same affect grid used in Study 3a to measure their need for arousal and need for pleasant feelings. As the affect grid was inserted between the measure of sleepiness and the manipulation of sound, the results on these measures did not capture the impact of stimulating sounds on need for arousal. Nevertheless, the results on these measures are reported here to provide additional information about the study.

Need for Arousal

As expected, need for arousal (M = 6.05, SD = 2.29) was significantly predicted by participants' sleepiness (r(270) = .37, *p* < .001). As need for arousal was measured before the manipulation of sound in this study, it could not possibly be affected by this manipulation and thus we did not test the interaction between sleepiness and sound manipulation on it.

Moderated Mediation Analyses

We predicted that sleepy consumers seek variety because they need more arousal (H4). Hence, we expected that when this need for arousal is satiated (e.g., by listening to stimulating sounds), the impact of sleepiness on variety seeking should be significantly diminished. We conducted a moderated mediation analysis based on 5,000 bootstrap samples (PROCESS Model 14; Hayes 2013) to verify these predictions, which generated a 95% bias-corrected CI of (-.1546, -.0340). When stimulating sounds had not been played to the participants, need for arousal mediated the effect of sleepiness on variety seeking (95% CI: [.0444, .1337]). In contrast, when participants had listened to stimulating sounds, this mediation effect disappeared (95% CI: [-.0507, .0380]).

Need for Pleasant Feelings

We observed that people needed more pleasant feelings (M = 7.09, SD = 2.12) as they felt sleepier(r(270) = .14, *p*= .021). However, need for pleasant feelings did not mediate the effect of sleepiness (PROCESS Model 14; 95% CI: [-0443, .0103]) on variety seeking in moderated mediation models.

WEB APPENDIX D

EFFECTS OF SLEEP DURATION LAST NIGHT AS A PROXY FOR SLEEPINESS

In Studies 3a, 3b, and 5, we also measured participants' sleep duration last night (indicated by number of hours slept the previous night; Gottlieb et al. 2006; Harrison and Horne 2000) and ran the analyses using it as a proxy for sleepiness. Below are the results on sleep duration last night as a predictor.

Additional Results on Sleep Duration Last Night in Study 3a

We expected that sleep duration last night could be used as a proxy for sleepiness (sleep duration last night and sleepiness: $r(217) = -.56$, $p< .001$), and in doing so it would influence variety seeking. Thus, we also tested the effects of sleep duration the previous night on variety seeking. Variety seeking was regressed on sleep duration last night (mean-centered), relaxation instructions (mean-centered), and their interaction. The results showed a significant interaction effect ($b = .18$, SE = .09, $t(215) = 2.02$, $p= .045$, $f^2 = .02$). More sleep-deprived participants chose more variety in the no-instruction condition ($b = -.15$, SE = .06, $t(215) = 2.40$, $p= .017$), but this effect was significantly weakened when participants in the relaxation-instruction condition were told that they could relax ($b = .03$, SE = .06, $t< 1$, NS).

Similar effects on need for arousal were obtained for sleep duration last night. In addition to its main effect on need for arousal ($b = -.28$, SE = .09, $t(215) = 3.16$, $p< .005$, $f^2 = .05$), sleep duration last night significantly interacted with instruction ($b = .69$, SE = .18, $t(215) = 3.85$, $p< .001$, $f^2 = .07$). More sleep-deprived participants had a stronger need for arousal in the no-instruction condition ($b = -.64$, SE = .12, $t(215) = 5.17$, $p< .001$). However, this effect was not evident in the relaxation-instruction condition ($b = .05$, SE = .13, $t < 1$, NS).

We ran a moderated mediation analysis to test whether need for arousal also drives

the effect of sleep duration last night on variety seeking. The analysis (PROCESS Model 7; 5,000 bootstrap samples) indicated a significant moderated mediation effect (95% CI: [.0381, .2136]). Sleep duration last night influenced variety seeking via need for arousal when participants were not instructed to relax (95% CI: [-.1737, -.0450]), but such effects were significantly weakened when they were asked to relax (95% CI: [-.0393, .0642]). An alternative model treating variety seeking as the mediator and need for arousal as the outcome did not yield significant moderated mediation effects (95% CI: [-.0086, .3246]).

The perceived difference between the candy flavors was not significantly affected by sleep duration last night orits interaction with the relaxation instruction (in each case,p> .10).In addition, participants showed a greater need for pleasant feelings when they slept fewer hours the previous night (b = -.24, SE = .07, t(215) = 3.34, p< .001, f^2 = .05), but it was independent of the relaxation-instruction manipulation (p> .20).

Additional Results on Sleep Duration Last Night in Study 3b

To examine whether similar effects are observed for sleep duration last night that could serve as a proxy for sleepiness (r(270) = -.63, p< .001), we regressed variety seeking on sleep duration last night (mean-centered), sound (mean-centered), and their interaction. The analysis showed significant main effects of sleep duration last night (b = -.09, SE = .04, t(268) = 2.25, p= .025, f^2 = .02) and sound (b = -.29, SE = .13, t(268) = 2.21, p= .028, f^2 = .02). Importantly, these effects were further qualified by a significant interaction effect (b = .29, SE = .08, t(268) = 3.77, p< .001, f^2 = .05). Sleep-deprived participants included more variety in their choices in the no-sound condition (b = -.22, SE = .05, t(268) = 4.11, p< .001), but participants did not do so when they had listened to stimulating sounds (b = .07, SE = .05, t(268) = 1.23, p> .20).

Need for arousal was significantly predicted by sleep duration last night (r(270) = -.33, p< .001). A moderation mediation analysis was conducted to test the mediational role of need

for arousal in the impact of sleep duration last night. The analysis revealed a significant

moderated mediation effect (PROCESS Model 14; 95% CI: [.0295, .1464]). Sleep duration

last night significantly influenced variety seeking through need for arousal when participants

had not listened to stimulating sounds (95% CI: [-.1256, -.0396]), but this causal chain was

broken when stimulating sounds were played to the participants (95% CI: [-.0370, .0439]).

We observed that the less participants slept last night, the more they needed pleasant

feelings(r(270) = -.16, *p*< .01). However, need for pleasant feelings did not mediate the effect

of sleep duration last night (95% CI: [-.0114, .0493]) on variety seeking in moderated

mediation models (PROCESS Model 14; 5,000 bootstrap samples).

Additional Analyses Using Sleep Duration Last Night in Study 5

As was observed in the additional analyses in Studies 3 and 4, sleep duration last

night can serve as a proxy for sleepiness. Indeed, participants included more variety in their

choices when they slept less last night (r(257) = -.26, *p*< .001). Participants were more likely

to include the novel, less positive flavor in their actual choices (r(257) = -.18, *p*< .005) when

they had less sleep last night. Less sleep last night also predicts more variety of non-novel

flavors chosen (r(257) = -.17, *p*< .005).Need for arousal was also significantly predicted by

sleep duration last night (r(257) = -.32, *p*< .001).

In Study 5, we expect that sleep duration last night, which is an objective fact, should

not show an effect as a result of task order, thereby providing an opportunity to test whether

any difference in need for arousal and sleepiness before and after the variety-seeking task was

specific to those who were more likely to feel sleepy and choose variety to begin with.

As expected, participants' reported sleep duration last night was not affected by task

order (M = 6.56, SD = 1.74 vs. M = 6.43, SD = 1.53 for sleepiness questions before and after

variety-seeking conditions, respectively; t < 1, NS). To test whether the reduction in

sleepiness was specific to the participants who were likely sleepier to begin with, we further

regressed participants' sleepiness on sleep duration last night (mean-centered), task order (mean-centered), and their interaction. The analysis yielded significant main effects of sleep duration last night (b = -.36, SE = .05, t(255) = 7.02, p< .001, f^2 = .19) and task order (b = -.39, SE = .17, t(255) = 2.35, p= .019, f^2 = .02), which were importantly qualified by a significant interaction effect (b = .29, SE = .10, t(255) = 2.80, p< .01, f^2 = .03). Specifically, having done the variety-seeking task or not did not influence sleepiness of the participants who slept longer last night (i.e., likely less sleepy to begin with; b = .08, SE = .24, t < 1, NS). However, participants who slept less last night (i.e., likely sleepier to begin with) indicated feeling less sleepy after they chose variety compared with before they did the variety-seeking task (b = -.86, SE = .24, t(255) = 3.66, p< .001).

Similarly, to examine whether the effect on need for arousal was driven by more sleep-deprived participants who tended to include more variety in their choices, we regressed the reported need for arousal on sleep duration last night, task order, and their interaction. The results revealed significant main effects of sleep duration last night (b = -.36, SE = .07, t(255) = 5.30, p< .001, f^2 = .11) and task order (b = -.55, SE = .22, t(255) = 2.49, p = .014, f^2 = .02), which were further qualified by a significant interaction effect (b = .29, SE = .14, t(255) = 2.13, p = .034, f^2 = .02). For the participants who had more sleep last night (i.e., likely less sleepy to begin with), their need for arousal did not vary as a function of whether or not they had completed the variety-seeking task (b = -.07, SE = .32, t < 1, NS). However, having done the variety-seeking task significantly reduced the need for arousal for those who slept less last night (i.e., likely sleepier to begin with; b = -1.03, SE = .32, t(255) = 3.28, p< .005).

WEB APPENDIX E

REPLICATING THE EFFECT OF SLEEPINESS ON VARIETY SEEKING WHEN

SLEEPINESS IS ASKED ABOUT AFTER THE VARIETY-SEEKING TASK

The results of Study 5 show that sleepiness can still predict variety seeking even when consumers are not cued of their sleepiness before the variety-seeking task, suggesting that the effect of sleepiness on variety seeking cannot simply be explained by priming. To provide another test of this conclusion, we conducted another study in which sleepiness is asked about only after the variety-seeking measure.

One hundred participants (45 females, M_{age} = 32.34) from Amazon's Mechanical Turk participated in this study for a payment of US$0.50. First, they were told that we were interested in consumers' preferences for gift cards. They were presented with gift cards from five stores (Walgreens, Target, CVS, Home Depot, and Whole Foods) as in Study 3b, and were asked to choose four gift cards from the set in any combination. They were also informed that they would be entered into a lucky draw in which they had the chance to win the four $25 gift cards they chose. After that, participants completed the Stanford Sleepiness Scale, which was administered in Studies 2–5. The redemption codes for the E-gift cards were sent to the winners of the lucky draw.

Consistent with the observation in Study 5, participants' sleepiness significantly predicts the variety of gift cards chosen (r(98) = .21. p = .036). Hence, both Study 5 and this study indicate that variety seeking varies as a function of sleepiness, even when consumers are not cued of their sleepiness before the variety-seeking task. Such results suggest that priming cannot account for the effect of sleepiness on variety seeking.