

# Decision Drivers to Facilitate Lower-Polluting Consumer Choices

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# Project Objectives

- Systematic Literature Review of Existing Interventions
- Online Experiments
- Communication Campaign

# The Green Bundle Framework

- Communications that tell people both how they can help the environment and how they can privately benefit are most likely to be effective
- Private benefits

## THE GREEN BUNDLE



PAIRING THE MARKET  
WITH THE PLANET

MAGALI A. DELMAS  
WITH DAVID COLGAN

# The Green Bundle



# Systematic Literature Review Search

Studies examining how to change consumer purchasing or consumption behavior to be lower polluting and more environmentally friendly

Interventions include:

email/postal messages, signs at stores, activities

Goal: identify effective intervention strategies

# Systematic Literature Review Search Terms

AB=("consumer behav\*" OR purchas\* OR "consumption")

AND AB=(intervention OR "field experiment" OR "randomized control trial" OR nudg\* OR "behav\* change" OR "choice architecture")

AND AB=("environmentally friendly" OR green OR "low\* pollut\*" OR "energy efficien\*" OR sustainab\* OR "electric vehicle\*" OR "car" OR "active mobility" OR "renewable energy" OR "solar" OR "transport\*" OR "organic")

\* means that the word can end any way  
e.g., purchas\* could be purchase,  
purchases, purchasing, purchaser

# Systematic Literature Review Search Terms



Contents lists available at [ScienceDirect](#)

Journal of Environmental Psychology

journal homepage: [www.elsevier.com/locate/jep](http://www.elsevier.com/locate/jep)



## A comprehensive socio-psychological approach to car type choice



Alim Nayum<sup>\*</sup>, Christian A. Klöckner<sup>1</sup>

NTNU – Norwegian University of Science and Technology, Department of Psychology, NO-7491 Trondheim, Norway

### ARTICLE INFO

#### Article history:

Available online 18 October 2014

#### Keywords:

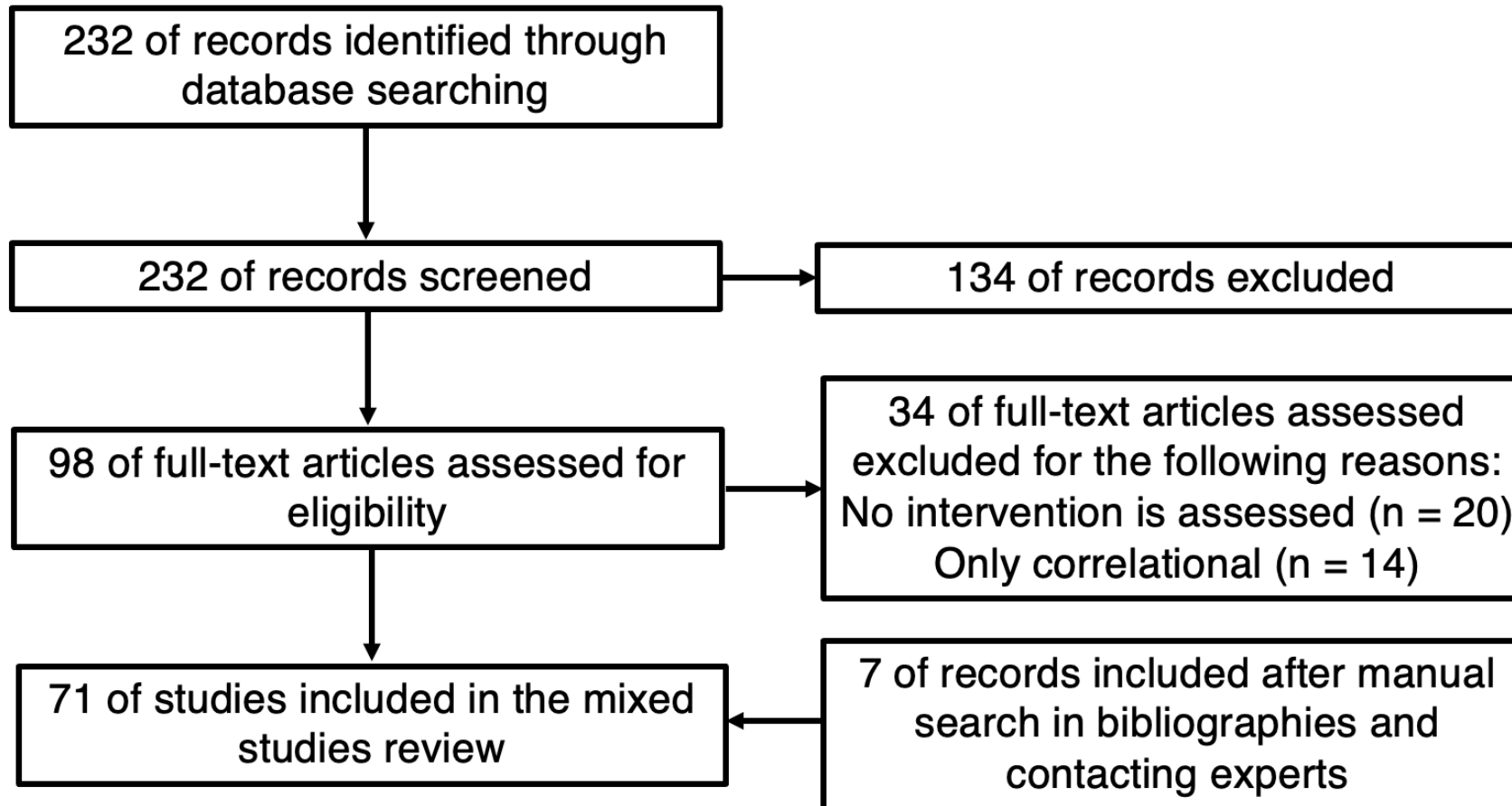
Car purchase  
Car types  
Fuel-efficient  
Battery electric cars  
Car attributes

### ABSTRACT

Data from a web survey, which was conducted in 2012 among 1421 owners of a new internal combustion engine car and 372 new battery electric **car** owners in Norway, were used to test an adapted version of the comprehensive action determination model to explain private consumers' **purchase** of fuel-efficient cars. It was first examined whether the average fuel efficiency differs among internal combustion engine car classes. Consequently, with battery electric cars being regarded as the most fuel-efficient group, five car groups ordered by fuel efficiency were retained. The results of subsequent structural equation modelling show that intention to buy a fuel-efficient car, brand loyalty, number of cars and driver's license holders in the household, household size, and household income had significant direct effects on choosing a more fuel-efficient car. Normative processes had a mediated impact on behaviour. Implications for design and implementation of **interventions** are discussed.

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# Article Selection Process





# Selected Journal Categories & Disciplines

- ***Web of Science Categories:***

- Environmental Sciences
- Environmental Studies
- Green Sustainable Science Technology
- Economics
- Business, Management
- Behavioral Sciences
- Psychology

- ***Research Areas:***

- Business Economics
- Psychology
- Behavioral Sciences

- **Journal Quality:**

- Excluded articles from journals with Journal Citation Indicators less than one (the average JCI in a category)

# Included Journals

- *American Journal of Agricultural Economics Appetite*
- *Applied Economic Perspectives and Policy Business Strategy and the Environment Ecological Economics*
- *Energy Economics Energy Policy*
- *Energy Research & Social Science Environment and Behavior Environmental & Resource Economics*
- *European Review of Agricultural Economics Food Policy*
- *Information Systems Research International Journal of Consumer Studies*
- *International Journal of Contemporary Hospitality Management Journal of Business Ethics*
- *Journal of Business Research Journal of Consumer Research*
- *Journal of Environmental Economics And Management Journal of Environmental Psychology*
- *Journal of Marketing*
- *Journal of Retailing and Consumer Services Journal of Sustainable Tourism*
- *Journal of the Association of Environmental and Resource Economists Journal of the European Economic Association*
- *Journal of Transport Geography*
- *Nature Climate Change Nature Energy*
- *Nature Sustainability*
- *Proceedings of The National Academy of Sciences of The United States Of America Psychology & Marketing*
- *Technological Forecasting and Social Change Transportation Research Part A-Policy and Practice*
- *Transportation Research Part F-Traffic Psychology and Behaviour*

# Systematic Literature Review Overview

Postdoc examined  
title/abstract for inclusion



2 research assistants examined  
title/abstract for inclusion and  
came to consensus



232 articles from Web of Science search

98 articles selected for inclusion

91% agreement

Cohen's kappa 0.82

Almost perfect agreement

After reading the full text, an additional 20  
articles were excluded

14 of these were entirely correlational

Additional 7 articles added from reference lists  
and contacting experts

leaving a grand total of 71  
articles

# Coded Variables

- Study randomization
  - Was it an experimental design?
- Statistical significance
  - If multiple interventions were used in a paper, only significant ones were included
- Independent variable (i.e., the intervention used)
- Dependent variable (e.g., food, transportation)
- Level of analysis (e.g., individual, household)
- Behavior change technique (e.g., social, financial)
- Type of behavior (e.g., measured, self-reported)
- Length of intervention
- Location of study (e.g., online, real-world)
- Effect size

# Dependent Variable

Type of Dependent Variable	Number of Articles	% of Articles
Electricity/Natural Gas/Water	30	42%
Food	18	25%
Transportation	12	17%
Other	9	13%
Clothing	2	3%
Total	71	100%

<b>Behavior Change Technique</b>	<b>Number of Articles</b>	<b>% of Articles</b>
Social	23	26%
Financial	22	25%
Quality	21	24%
Health	12	14%
Environment only	7	8%
Emotion	3	3%
<b>Total</b>	<b>71</b>	<b>100%</b>

	Social Status	Financial	Quality	Health	Emotion
Different elements of each bundle category	Descriptive norm	Savings	Usability/Convenience	Direct health benefits	Guilt
	Social influence	Rebates/Discounts/Surcharges	Taste	Broad health benefits	Positive
	Injunctive norm		Performance	Mindfulness	
	Competition		Choices		
	Goal		Comfort		
				Durability	
Frequency of studies in this area	23	22	21	12	3
Behavioral measure	Majority measured behavior	Majority measured behavior	Majority measured behavior	Majority measured behavior	Majority measured behavior
One good example	Publicly displaying norm information on posters (Delmas & Lessem, 2014)	Provide long-term costs or savings—e.g., 1 year vs. 1 month, 100,000 miles vs. 100 miles (Camilleri & Larrick, 2014)	Make lower-polluting options the default (Momsen & Stoerk, 2014)	Describe health benefits of vegetarian or organic (Jalil et al., 2020)	Exercise can improve mood and sustainable purchasing (Sarkar et al., 2022)
Key factors of success	Publicly visible to others	Savings should seem substantial to individual targeted	Make it easier to go green	Personal health benefits when possible	Positive mood

# Descriptive & Injunctive Norms

*Descriptive norms*

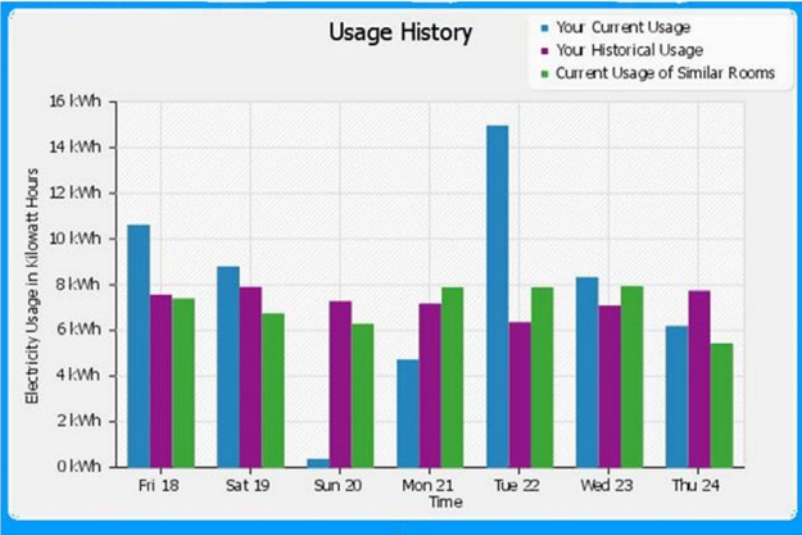
What other people are doing

*Injunctive norms*

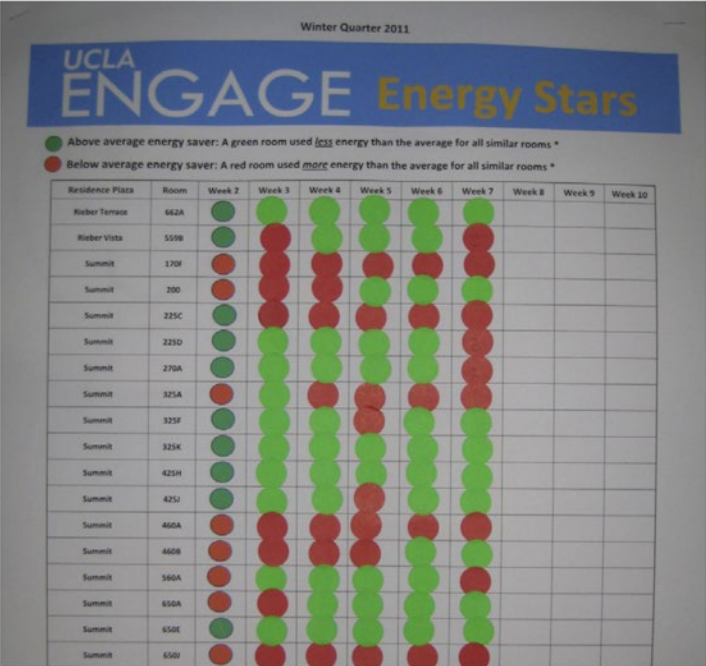
What behavior is considered socially acceptable



# Descriptive & Injunctive Norms



Feedback about own energy usage compared to others



Public posters indicating above average and below average energy usage rooms

# Descriptive & Injunctive Norms

## Set realistic expectations

If the target behavior is too far out of reach, people may stop working toward a goal

## Consider a person's "in-group"

Social norms are more effective when they come from individuals or groups that an individual identifies with or respects.

# Descriptive Norms (Negative Spillover)




Dear Residents,  
We all should do our part to preserve our environment.

Please join our efforts to make Lynnfield Commons more sustainable!

LYNNFIELD COMMONS  
1000 Lynnfield Commons  
Cambridge, MA 02142

This study is carried out by the Fraunhofer Center for Sustainable Energy Systems, Cambridge, MA.

Dear resident(s) of apt. # 2-101,



Here is your water usage for last week:

Top Lynnfield Commons apartments*	<u>75</u> gallons per person
Your apartment	<u>298</u> gallons per person

\*Average of top 10 participating apartments

A full bathtub requires up to 70 gallons of water, whereas taking a 5-minute shower uses only 10 to 15 gallons.

- 6% decrease in water usage (targeted behavior)
- 6% increase in electricity usage (nontargeted behavior)

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# Financial

- Price of gasoline and diesel reduces fuel usage (Zimmer & Koch, 2017)
- Getting information about energy costs of lightbulbs leads to increased willingness to pay for energy-efficient lightbulbs (Min et al., 2014)

# Financial

- Provide savings over a longer time window (1 year vs. 1 month)
- Frame as a loss rather than a gain
  - A charge for plastic bags is more effective than a bonus for bringing own bag (Homonoff, 2018)

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# Elements of Quality

Elements of Quality	Number of Articles	% of Articles
Usability/Convenience	10	48%
Taste	5	24%
Performance	3	14%
Choices	1	5%
Comfort	1	5%
Durability	1	5%
Total	21	100%

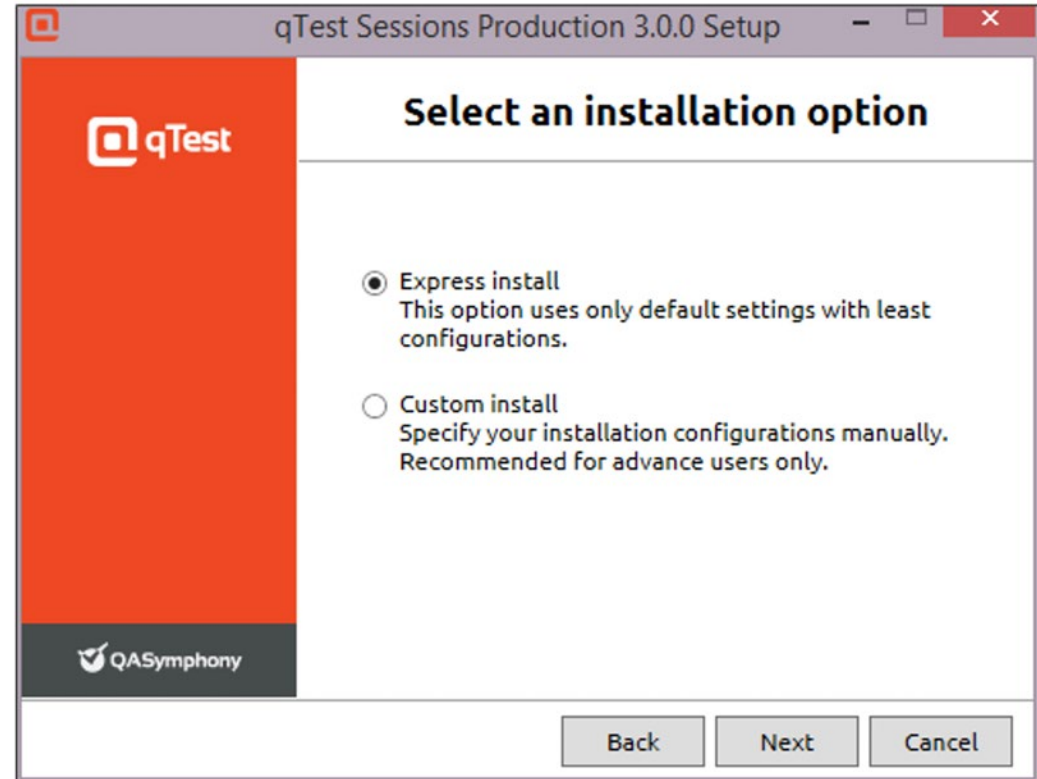


# Convenience

Make sustainable options the default.

## Default options

Options that are automatically selected unless an alternative is chosen



# Convenience

- Default household energy sources, which vary in environmental friendliness (Ghesla et al., 2020)
- Default office lighting (e.g., overhead lighting setting, blinds open; Heydarian et al., 2016)
- Default household electricity savings goal (Loock et al., 2013)
- Eco driving mode activated by default (Kutzner et al., 2021)
  - Ineffective at reducing fuel consumption because drivers countered the measure by pressing harder on the accelerator pedal

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# Health

Email messages emphasizing air pollution and health impacts associated with energy use outperformed information about financial savings at reducing electricity usage



Asensio & Delmas (2015)

# Health

- Lower-polluting food can frequently provide direct health benefits (e.g., vegetarian options)
- These can be presented as avoiding negative health impacts (e.g., avoiding cardiovascular health problems)
  - Important to provide easy solutions to this problem

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# Emotion

- Experiences with nature promote emotional affinity toward nature.
  - These experiences can then lead to nature-protective behavior.
- Experiential purchases (e.g., vacations) are more closely linked with personal identity than material purchases (e.g., televisions).

Kals, Schumacher, & Montada (1999)

Carter & Gilovich (2012)

Sarkar et al., 2022

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<b>Behavior Change Technique</b>	<b>Measured Behavior</b>	<b>Self-Reported Behavior</b>	<b>Behavioral Intention</b>	<b>Total</b>
Social	17	4	2	23
Financial	16	2	4	22
Quality	14	1	6	21
Health	8	4	0	12
Emotion	2	0	1	3
Environment only	2	1	4	7
<b>Total</b>	<b>59</b>	<b>21</b>	<b>17</b>	<b>88</b>

# Environment Only

- Self-reported willingness to reduce air/car travel to reduce carbon emissions (O'Garra, & Fouquet, 2022).

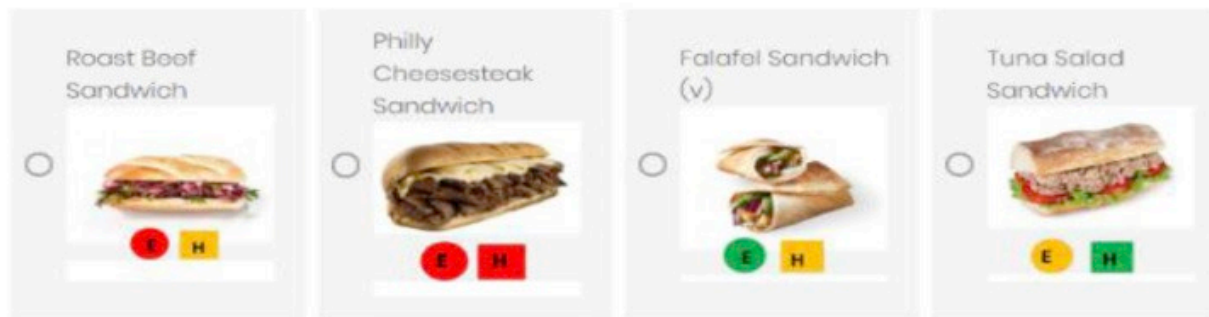


# Environment Only

Which of these options would you choose?

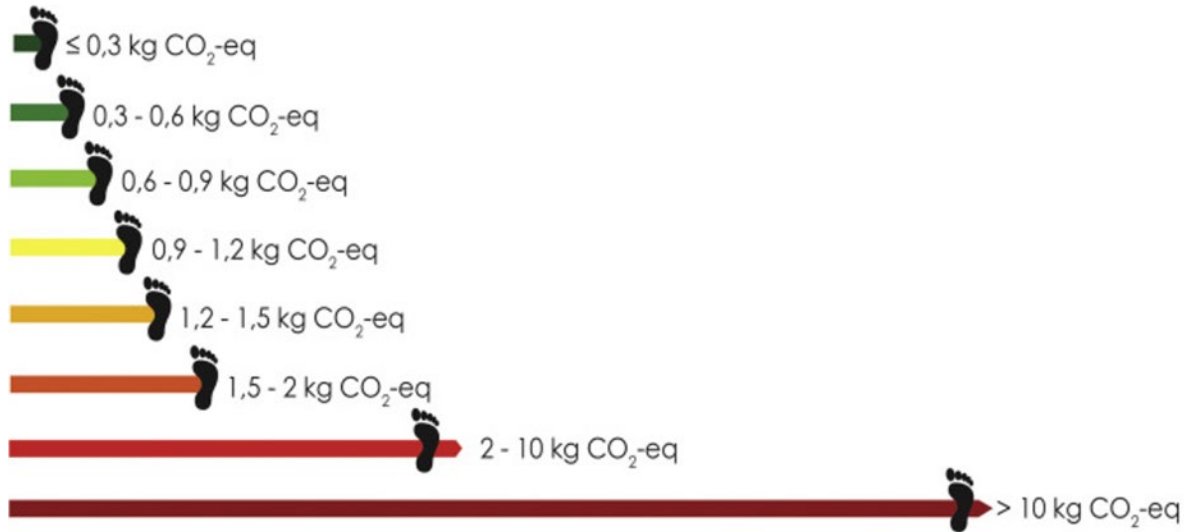


Which of these options would you choose?



- Different colors indicate environmental impact of meal
  - Green = low impact
  - Yellow = medium impact
  - Red = high impact
- Hypothetical decisions

# Environment Only



- Different colors and length of line indicate environmental impact of meal
  - **Green** = low impact
  - **Yellow** = medium impact
  - **Red** = high impact
- Actual purchasing decisions in Swedish university restaurant but might still be influenced by social desirability

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Key factors of success	Publicly visible to others	Savings should seem substantial to individual targeted	Make it easier to go green	Personal health benefits when possible	Positive mood

# Systematic Review Main Findings

- Results support the Green Bundle framework that private benefits are important for changing consumer behavior.
- Providing simple information about the various benefits such as *quality, social status, health, financial benefits, and emotional returns* can be one way to make consumer behavior greener and lower-polluting.

# Optimal Green Bundle Pairings

- Questions remain about optimal pairings
- Research suggests certain elements pair effectively (e.g., Quality + Status), while others do not (e.g., Money + Emotion)



# Using Behavioral Science to Change Behavior

- The systematic review demonstrated how behavioral science research can be used make consumer behavior lower-polluting
- Behavioral science interventions can be used to achieve other CARB goals



# Experiment 1

- Goal of increasing attendance at online CARB research seminars
  - 5,000 invited, <100 attend
  - Online seminars may not have sense of urgency because they will be recorded and available to watch later
    - “Don’t miss” wording is a popular business practice
    - Fear of missing out can motivate behavior (Alt, 2015; Hoetjes, 2013; Hodkinson, 2019)

# Experiment 1

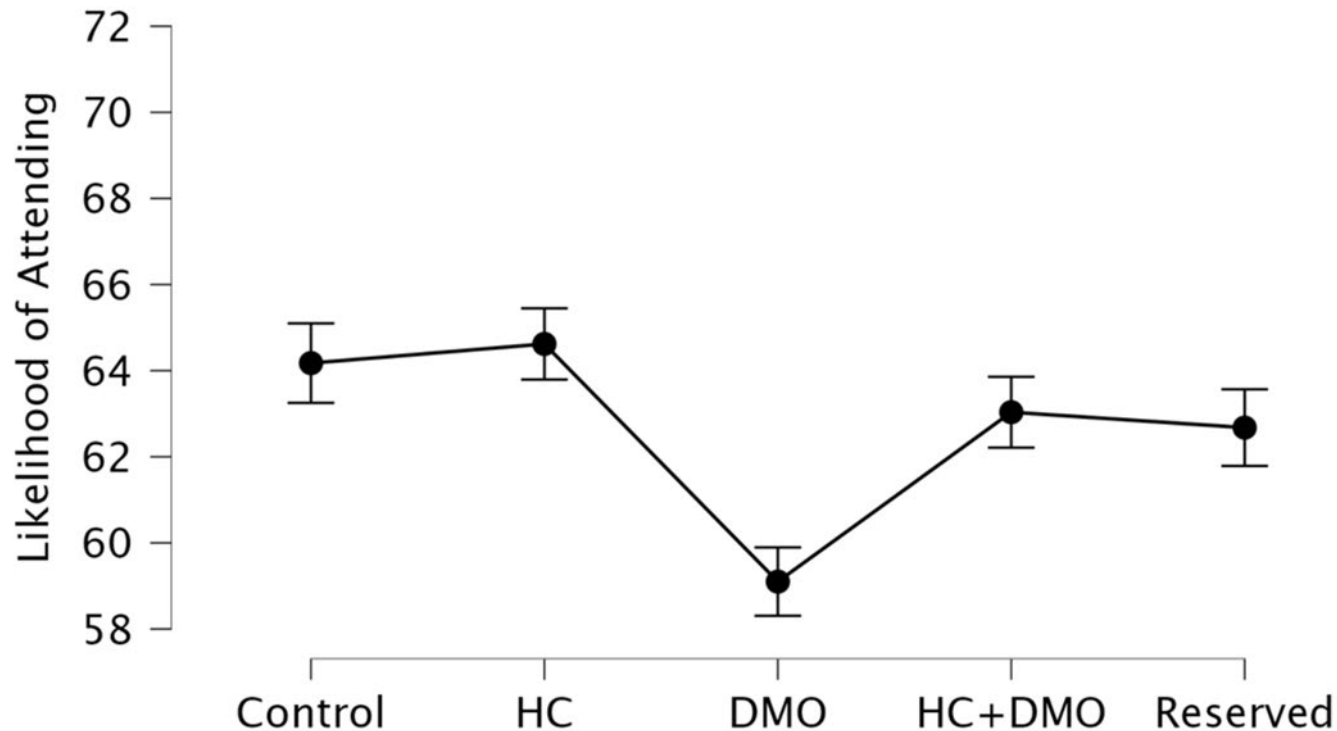
1,241 participants on Amazon's Mechanical Turk (Mturk) were asked:

Imagine that you receive an email for an upcoming online research presentation on a topic that interests you. Each email begins with a slightly different message. Please rate each of these messages on how likely you would be to attend the research presentation after reading each message.

# Experiment 1

- This is your chance to see the researchers present their work. (Control)
- This is your chance to interact with the researchers and ask your questions. (Human Connection)
- Don't miss your chance to see the researchers present their work. (Don't Miss Out)
- Don't miss your chance to interact with the researchers and ask your questions. (Human Connection + Don't Miss Out)
- We have reserved a spot for you to see the researchers present their work (Reserved)

# Experiment 1



This is your chance to see the researchers present their work. (Control)

This is your chance to interact with the researchers and ask your questions. (Human Connection)

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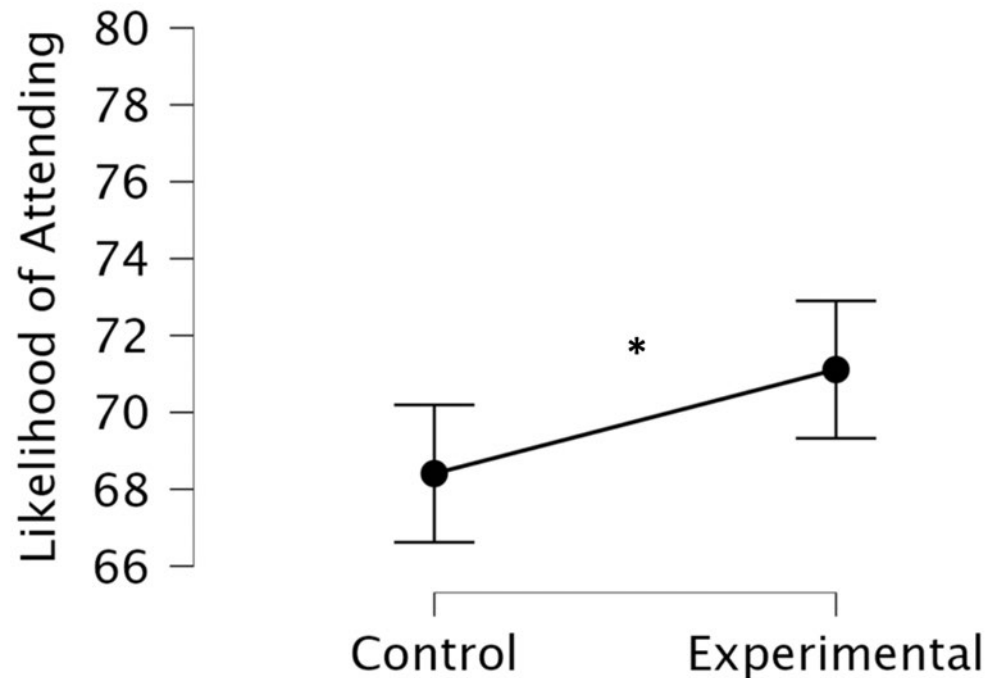
Don't miss your chance to interact with the researchers and ask your questions. (Human Connection + Don't Miss Out)

We have reserved a spot for you to see the researchers present their work (Reserved)

# Experiment 2

- The Green Bundle framework emphasizes the combined impact of altruistic and egoistic motivations as a potent force for changing behavior.
  - Come see the researchers present their work. (Control)
  - We need your insights, input, and ideas. (Experimental)

# Experiment 2



\*  $P < .05$

## Control

Come see the researchers present their work.

## Experimental

We need your insights, input, and ideas.

# Overall Conclusions

- Effective interventions should incorporate information about both private benefits and environmental benefits
- Providing information about quality, social status, health, financial advantages, and emotional returns can encourage more sustainable and less polluting consumer actions.
- Designing communication messages that incorporate this blend can be an efficient way to modify consumer behavior.
  - For example, our suggested message, "We need your insights, inputs, and ideas," exemplifies how these motivations can be effectively employed to increase participation in research seminars.