

Building Climate Citizenry Through Personal Carbon Accountability

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The problem: a disengaged public

- Global CO₂ emissions from fossil fuels hit a record 38 billion tons in 2025; CO₂ has passed 425 ppm — a one-half increase since 1800.
- Emissions keep rising despite cheaper low-carbon options — consistent with a public putting little pressure on leaders to act.
- High-income societies/individuals account for the bulk of energy demand and carbon emissions — and of policy influence.
- Individual-level action is often dismissed as a distraction from systemic change: the “i-frame” substituting for the “s-frame.”

Our question: can positively framed personal carbon accountability in one everyday domain spill over into broader climate attitudes and policy support?

From daily choices to climate citizenry

- Hypothesis: high-frequency micro-behaviors — daily travel choices — can, through repeated engagement and reflection, aggregate into broader climate policy attitudes.
- This is the micro-to-macro linkage of the Coleman boat framework.
- We engage the individual as commuter, consumer, and citizen — ultimately to build demand for systemic change (carbon/congestion pricing, public transport, green infrastructure).

“Building climate citizenry one campus, one cohort, one semester at a time may be among the more tractable paths to the systemic change that the climate crisis demands.”

Where the idea began (The Business Times, 2023)

- Op-ed: “How open data and gamification can make Singapore’s urban travel greener.”
- Singapore’s SimplyGo fintech platform already lets any commuter download 180 days of their own bus and train transactions.
- Idea: give each person a monthly “urban travel carbon score” in gCO₂ per km — a car ride ~200 gCO₂ per km, an MRT ride far less — and reward staying under a target.
- “The game would be voluntary, hopeful, and positive, not shameful and negative.”

This RCT operationalizes that public proposal — and tests whether it works.

Design: a preregistered field RCT

- 327 young citizens (NUS undergraduates), Jan–May 2024; attrition just 4%.
- 11-week personalized travel diary (60,781 trips), audited against 5 transport platforms; 3 attitudinal surveys.
- Advertised neutrally as a study of “consumption patterns” — no mention of climate — to avoid selecting on green preferences.

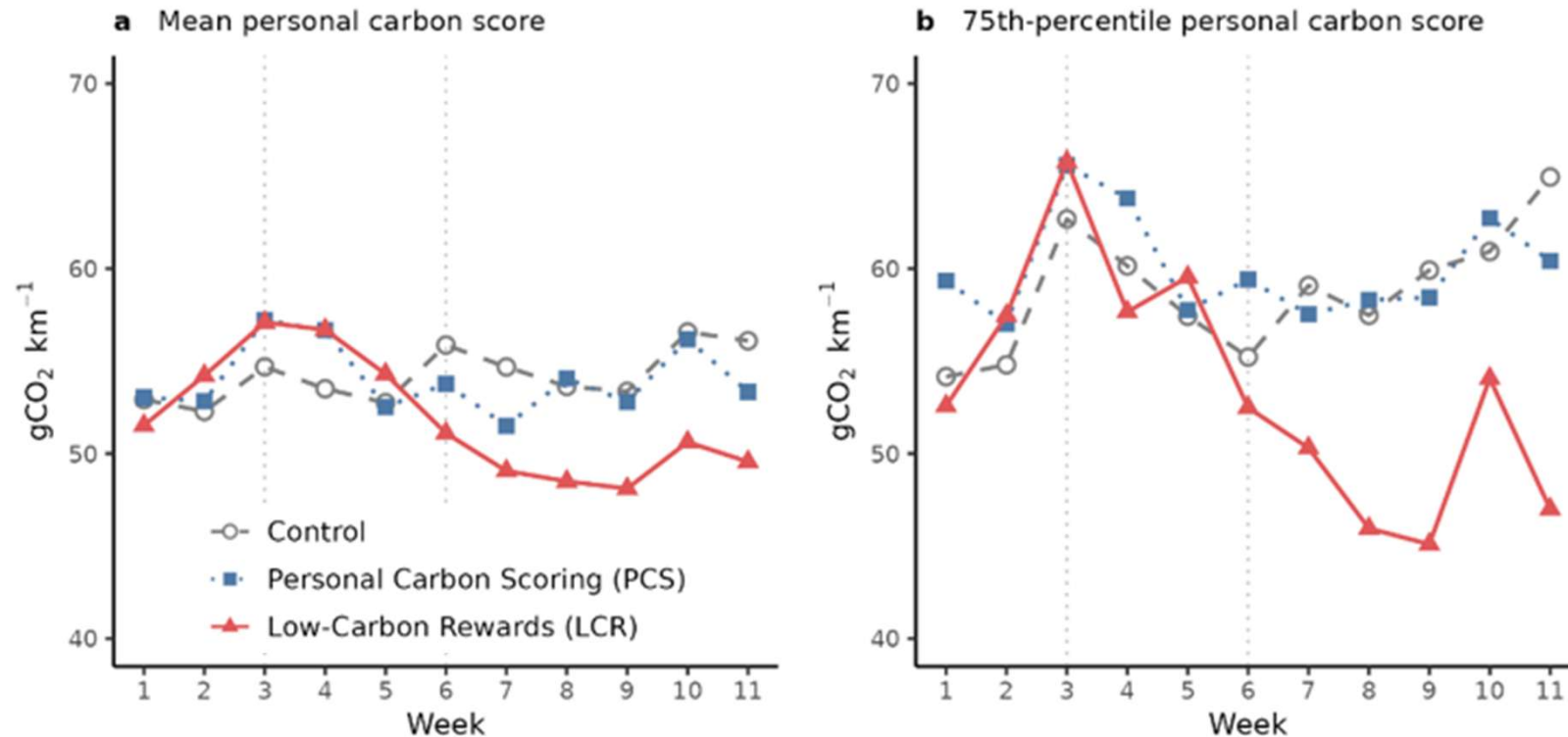
Group	Env. messaging	Personal Carbon Scores	Low-Carbon Rewards	Attitudinal surveys
Control	—	—	—	Pre-intervention (week 2), post-intervention (week 11), and exit/persistence (week 15)
PCS	weeks 3–11	weeks 6–11 ☐	—	
LCR – most intense	weeks 3–11	weeks 3–11	weeks 6–11 ☐	

Staggered and stacked features isolate each component’s marginal contribution (Fig. 1).

First, the behavior

(briefly — the attitudes are the bigger story)

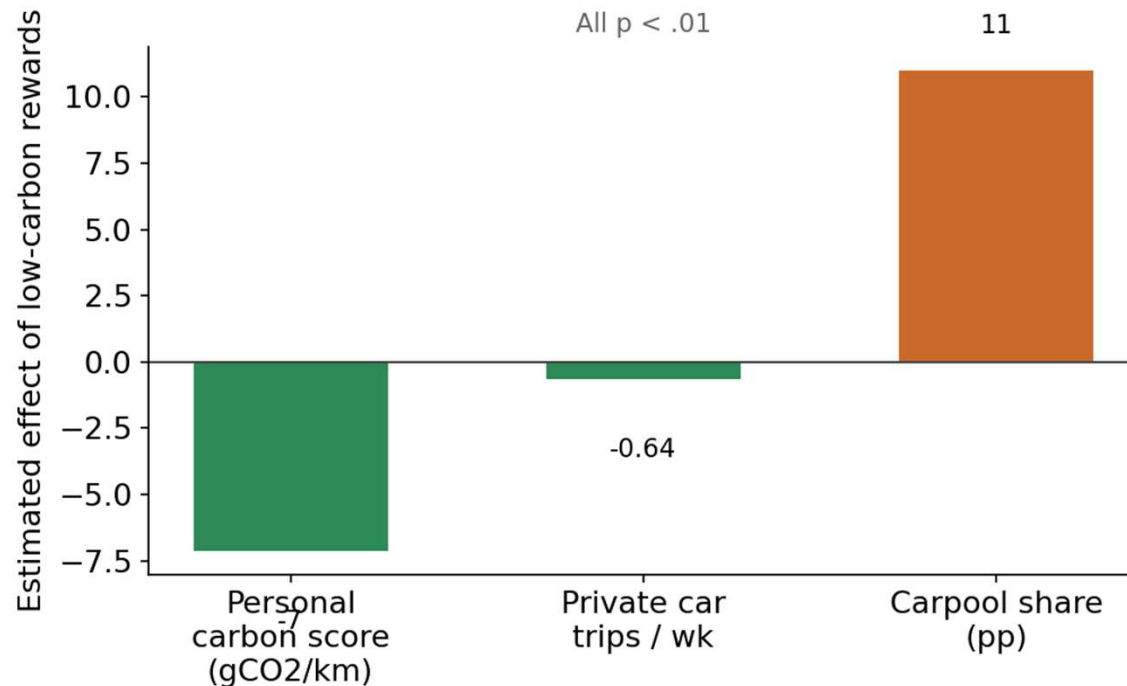
Rewards reduced the carbon intensity of travel



- Groups track together through week 5.
- When low-carbon rewards begin (week 6), the LCR group's scores fall consistently below the others.
- Driven by fewer single-occupancy car rides and more carpooling.

Fig. 2a-b — mean and 75th-percentile personal carbon scores (gCO₂ km⁻¹).

Personal-level decoupling emissions from mobility



- Rewards cut the carbon score by $-7.11 \text{ gCO}_2/\text{km}$ ($p < .001$).
- Private car trips fell $0.64/\text{week}$; carpool share rose 11 pp.
- Total motorized distance unchanged — same mobility, lower carbon.
- Messaging and scoring alone did not move behavior.

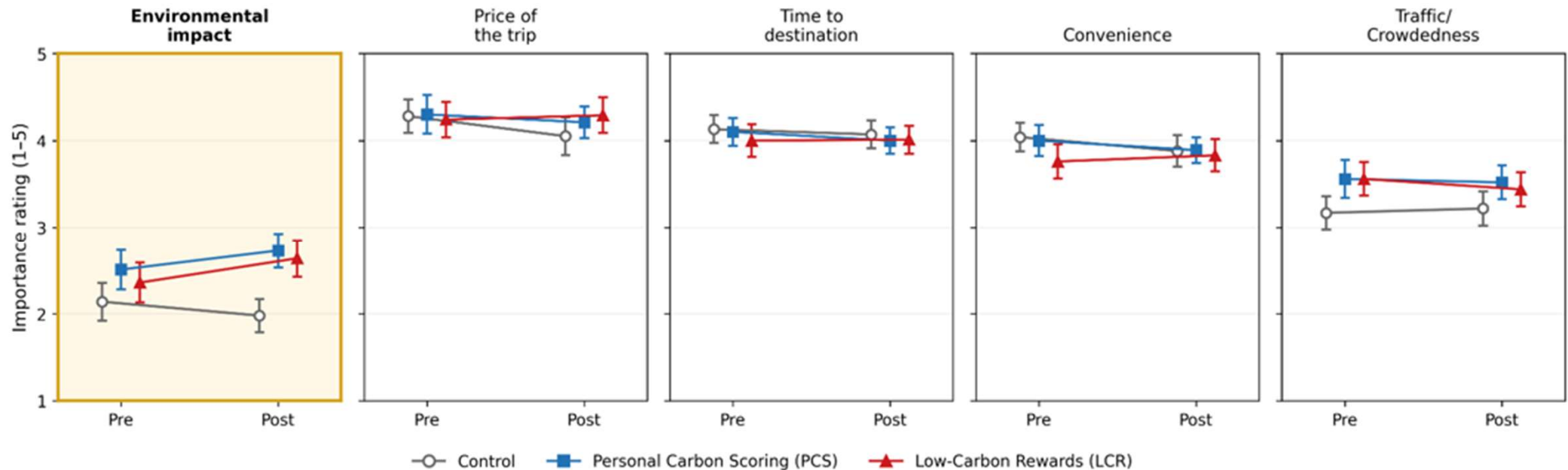
Largest where there was most room to shift

- Effects were strongest among participants from car-owning families and those with prior ride-hailing use.
- For these subgroups, rewards effects were as much as twice as large — their baseline travel was the most carbon-intensive.
- The intervention worked mainly by facilitating substitution away from solo car use among those with the most access to it.
- These are also members of high-income households, who tend to contribute disproportionately to emissions over their lifetimes.

The heart of the study: attitudes and policy support

Does within-domain accountability spill over — and does it last?

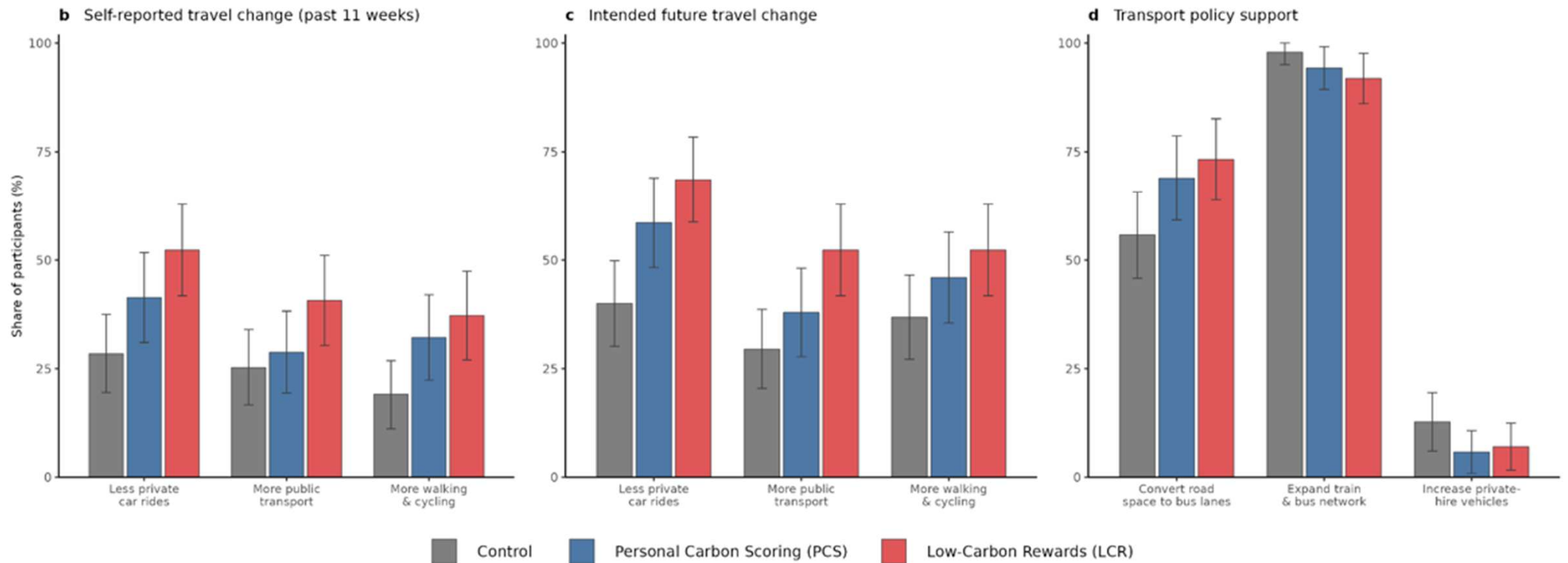
Environmental mindedness of travel choices rose



- Groups started equal in the (low) importance placed on the environment.
- After: both PCS ($d=0.79$) and LCR ($d=0.70$) rated environmental impact significantly more important than Control.
- No shift for price, time, convenience, or crowdedness.

Fig. 3a — importance (1–5) of environmental impact in travel-mode choice.

Recalled & pledged shifts toward low-carbon travel



- 52% of LCR reported fewer private car rides vs 28% of Control ($p=.005$).
- LCR 60% less likely than Control to report higher car use.
- Treated participants reported greater increases in active mobility (37% LCR, 32% PCS vs 19%).
- Both treatments more likely to pledge fewer future car rides ($p<.001$).

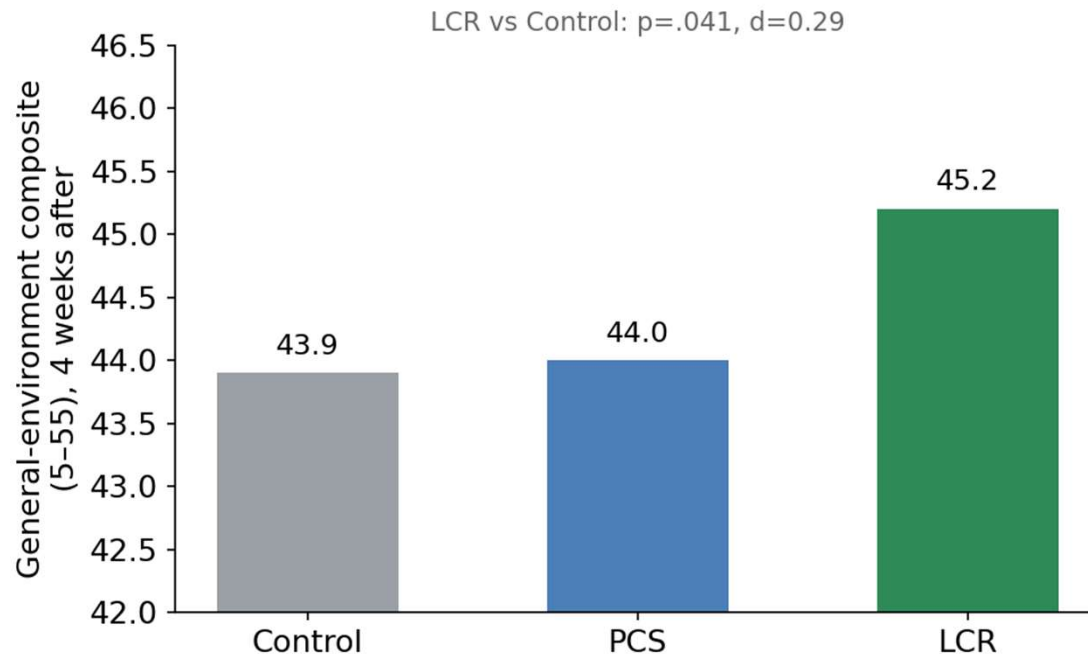
Fig. 3b-c — perceived and intended changes over 11 weeks.

Stronger support for green infrastructure

- Asked to advise government on transport investment, LCR showed the strongest endorsement of converting road space to dedicated bus lanes, followed by PCS, then Control ($p=.035$).
- Support for simply expanding the network was high everywhere — the shift is toward reallocating space, a genuine policy trade-off.

**The i-frame did not substitute for the s-frame —
sustained personal accountability elevated support for systemic policy.**

Cross-domain attitudinal spillover – that persists



- Four weeks after the intervention, LCR scored significantly higher than Control on an 11-item general-environment composite ($p=.041$, $d=0.29$).
- This is an intention-to-treat (causal) estimate
- Driven by items well beyond transport: “humans are abusing the environment”; people’s actions to reduce impact are important; disagreeing that the “climate crisis... has been exaggerated.”

Measured at week 15 — four weeks after every intervention feature was withdrawn.

Not intrusive — and welcomed

- Attrition just 4% over a semester; LCR had zero attrition weeks 1–11.
- About half of treated participants opted to keep the travel diary privately beyond the study.
- Over three-quarters paid at least some attention to the environmental messages.
- Rewards deepened engagement with scoring specifically — stronger motivation, effort, and comprehension than scoring alone (all measured).

A replicable model — and a fintech path to scale

- Universities enroll hundreds of millions of young, often affluent citizens during a formative window — embed personal carbon accountability into general education at modest cost.
- The month-later shifts survived a period that coincided with end-of-semester exams — conditions that should attenuate, not amplify, any lingering effect.
- Extend beyond transport to food and aviation, where emissions understanding is low.
- A SimplyGo-style opt-in platform could map mobility transactions into personal carbon accounts under privacy-safeguarding open-data rules.
- A “Singapore Climate Awareness Month” — and a tool to help manage rising climate anxiety.

“initially i had always been someone who took grab to school, but participating in this programme has made me change my habits... this active change has actually lifted my mood... i believe it is little choices like this that help reinforce a sense of hope that we have some agency over the outcomes of climate change.”

— A participant from group Low-Carbon Rewards, who wrote in voluntarily

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