nature portfolio

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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☐	☒	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	No software was used for data collection
Data analysis	STATA statistical package (version 16.0), ArcGIS Online, Python

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

First, the mobility dataset is proprietary to SK Telecom and the dataset is subject to strict privacy regulations. Next, the credit card consumption dataset is proprietary to BC Card and subject to privacy regulations. Both datasets were anonymized and aggregated before being shared with the authors. The data that support the findings of this study are available from the corresponding author upon request. Other datasets, including the official COVID-19 cases, are publicly accessible from this link: https://github.com/jieun0441/SP_Korea.

Research involving human participants, their data, or biological material

Policy information about studies with human participants or human data. See also policy information about sex, gender (identity/presentation), and sexual orientation and race, ethnicity and racism.

Reporting on sex and gender	N/A
Reporting on race, ethnicity, or other socially relevant groupings	N/A
Population characteristics	N/A
Recruitment	N/A
Ethics oversight	N/A

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☒ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	This study examines the effects of a geographically restricted COVID-19 stimulus programme on consumer behavior, public mobility, and virus transmission in Seoul, South Korea. It leverages passively collected behavioral data from three sources—credit card transactions, mobile phone mobility records, and confirmed COVID-19 cases—to evaluate behavioral and epidemiological changes before and after stimulus disbursement. The study period spans January to August in both 2019 (pre-pandemic) and 2020 (policy year), enabling a difference-in-differences analysis.
Research sample	The research sample includes:Credit card users from BC Card, South Korea's largest card issuer, representing approximately 23% of market share. The dataset covers over 20 million users and spans diverse demographic and geographic segments across Seoul. Mobile phone users from SK Telecom, which holds 42% of the national mobile telecom market, with a user base of 27 million. Movement data are weighted to match the age, sex, and regional distribution of the national population.COVID-19 case reports at the neighbourhood or district level, covering confirmed cases in Seoul as reported by the Korea Disease Control and Prevention Agency (KDCA) and local government agencies. All datasets are anonymized and aggregated to the neighbourhood (dong) level and contain no identifiable individual information.
Sampling strategy	This study uses a population-based sampling strategy via administrative and commercial data sources with high national coverage. No active recruitment was involved. For credit card and mobility data, all observed users within the respective datasets during the study period were included. SK Telecom mobility data were weighted by demographic characteristics to enhance representativeness. COVID-19 case data were used as reported, with analysis limited to neighbourhoods where sufficiently granular data were publicly released.
Data collection	Data were collected under data-sharing agreements with private and public providers. BC Card provided weekly transaction-level data disaggregated by consumer and merchant characteristics. SK Telecom provided weekly bilateral mobility flows based on mobile device location pings. COVID-19 case data were obtained from KDCA and local authorities. All data were anonymized and pre-aggregated before being accessed by the researchers.
Timing	The analysis covers Weeks 0 to 31 (January to August) in both 2019 and 2020. The COVID-19 stimulus disbursement occurred in Week 20 of 2020. The 2019 data serve as a seasonal control to isolate year-over-year changes. This structure enables comparison of pre- and post-policy behaviors within and across years.
Data exclusions	We excluded credit card transactions not related to physical consumption, such as e-commerce, public transportation, utility bills, tax payments, and voucher purchases. In the mobility data, we excluded visits where users spent less than 30 minutes in a neighbourhood, to eliminate transient or incidental trips. For the COVID-19 data, we excluded areas where only city/province-level data were available and could not be matched to specific neighbourhoods.
Non-participation	This study did not involve primary data collection or direct human participation. All data were collected passively. Non-participation is not applicable.
Randomization	This was an observational study and did not involve experimental randomization.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Plants

Seed stocks	N/A
Novel plant genotypes	N/A
Authentication	N/A