Constanza Avalos-Valdebenito

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RESEARCH INTERESTS

Causal inference · Transportability & generalisation of trial findings · Doubly robust machine learning · Food systems modelling · Complex survey design · Econometric evaluation of health policies

RESEARCH STATEMENT

Constanza is a finishing PhD researcher in Social Statistics at the University of Manchester, specialising in causal inference methods for evaluating health and food policy. Her doctoral work develops novel doubly robust machine learning estimators — combining Bayesian additive regression trees and gradient boosting — to generalise randomised trial findings to national target populations in non-nested designs. This positions her at the intersection of causal modelling, food labelling policy, and population-level inference. Prior to her doctorate, she built and directed national data infrastructure at Chile's National Institute of Statistics, providing rare expertise in large-scale food system datasets, multistage survey design, and algorithmic data quality control at census scale.

RESEARCH EXPERIENCE

University of Manchester *Manchester, United Kingdom*

PhD Researcher *Oct 2021 – Present*

Thesis: Estimating population average treatment effects for food labelling policy: A causal inference approach for generalising trial findings to target populations in non-nested designs.

- Developed and validated a novel doubly robust ML estimator pipeline (BART + gradient boosting) to adjust for confounding and transport causal effects from a food labelling RCT to the UK adult population, combining trial data with NDNS observational data via augmented inverse probability weighting and G-computation.
- Designed and implemented an online randomised controlled trial (n = 498 representative UK sample via Prolific) to test the causal effects of food label granularity on food choice and working memory — from experimental design through pre-registration to analysis.
- Built a cost-effectiveness and microsimulation model to quantify the population-level economic impact of alternative food labelling policies, translating trial findings into policy-relevant outcomes (QALYs, dietary change).
- Conducted feature engineering to integrate large-scale health and nutritional datasets (NDNS, UK Biobank-adjacent) for use in causal modelling, resolving mixed-type data challenges for ML-based covariate selection.
- Published 2 peer-reviewed papers (2025–2026) and 1 manuscript in preparation; presented findings at 5 national and international conferences.

Alan Turing Institute *London, United Kingdom*

Enrichment Placement Researcher *Jan – Jul 2025*

- Developed a principled causal inference framework for enhancing the external validity of RCTs, fusing trial data with observational population datasets through statistical matching and reweighting — work directly extending the PhD thesis into a transferable methodological toolkit.
- Co-organised and secured £2,000 funding for the institute-wide workshop 'Digital Twins: A Collaborative Workshop for Practical Application and Knowledge Exchange', bringing together researchers across health, engineering, and social science.
- Presented doctoral research at the ATI PhD Research Showcase and attended the Oxford Machine Learning Summer School (MLx Generative AI), supported by £1,000 ATI enrichment funding.

University of Manchester *Manchester, United Kingdom*

Research Assistant *Apr 2024 – Apr 2025*

- Designed and executed a systematic literature review on the online illicit drug market, performing data extraction and quality assessment; synthesised findings into policy-facing reports on public health implications and research gaps.

LEADERSHIP & DATA ANALYSIS EXPERIENCE

National Institute of Statistics (INE) *Santiago, Chile*

Chief, Department of Agricultural Statistics *Apr 2018 – Jan 2019*

- Directed Chile's national agricultural statistics programme, leading a multidisciplinary team of 15 statisticians, data analysts, and IT staff with a $1M USD annual budget and accountability for 18 institutional publications.

- Designed the sampling and digital data capture strategy for the 2021 Agricultural Census, deploying an offline-capable field platform across remote rural locations — a methodological challenge directly analogous to population-scale food systems data infrastructure.
- Oversaw the production of monthly, quarterly, and annual statistical reports for 12 longitudinal surveys, including the national livestock, crops, and food industry bulletins.

Coordinator, Department of Agricultural Statistics *Apr 2015 – Mar 2018*

- Designed and coordinated 6 nationally representative longitudinal surveys (livestock, crops, food industry) using complex multistage sampling — building deep expertise in the statistical infrastructure underlying national food system monitoring.
- Led a field operation of 20+ supervisors and 100+ surveyors; developed and deployed time-series predictive algorithms to flag data inconsistencies at point-of-entry.
  - Reduced the data collection lifecycle by one month for 95% of entry points; achieved a 10% reduction in measurement error and missingness through algorithmic quality control.
- Authored the Chilean case study for the FAO World Programme for the Census of Agriculture 2020 (Volumes 1 & 2), documenting innovations in national survey design, sampling methodology, and digital data collection for international guidelines.

Previous roles (2009–2015): Programme impact evaluation, Chilean Ministry of Art & Culture; consumer data analytics, private sector; elderly care work (Heritage Home Care, Ireland).

EDUCATION

University of Manchester *Oct 2021 – May 2026 (expected)*
PhD in Social Statistics

University of Manchester *Oct 2020 – Sept 2021*
MSc Social Research Methods and Statistics Distinction

Universidad Santiago de Chile *Mar 2013 – Jul 2016*
BSc in Economics Distinction

Universidad de Valparaíso *Mar 2003 – Dec 2008*
BA in Sociology Distinction

PUBLICATIONS & PEER REVIEW

Journal Articles ·

- Avalos, C., Wang, Y., & Shryane, N. (in preparation). On the selection of covariates for transportability: A doubly robust machine learning approach for generalising a food labelling trial with mixed-type data.
- Avalos, C., Wang, Y., & Shryane, N. (2026). Food label readability and consumption frequency: Isolating content-specific effects via a non-equivalent dependent variable design. Nutrients, 18(2), 197. https://www.mdpi.com/2072-6643/18/2/197
- Avalos, C. (2025). Food label granularity and working memory: Effects on food choice in a randomised controlled trial. Journal of Health, Population and Nutrition, 44, 375. https://link.springer.com/article/10.1186/s41043-025-01076-x

Technical Reports & Institutional Publications

- FAO (2019). World Programme for the Census of Agriculture 2020, Vols 1 & 2. Co-authored Chilean case study on innovations in survey design and digital data collection.
- INE Chile (2018). Statistical Yearbook 2018 — authored the National Agricultural Statistics chapter.
- INE Chile (2018). Bulletin of Livestock, Crop, and Dairy Food Industry Statistics — directed production as department head.

Peer Review

- Reviewer, British Food Journal.

TEACHING & MENTORING

University of Manchester — Graduate Teaching Assistant*2023–2025*

- SOST70032: Complex Survey Designs and Analysis
- SOST70172: Quantitative Evaluation of Policies, Interventions and Experiments
- SOST70520: Methodology and Research Design
- Helpdesk Support TA: one-on-one statistical modelling, complex survey design, and R troubleshooting for postgraduate students.

CONFERENCES & TALKS

PhD Research Showcase, Alan Turing Institute*Jul 2025 · London*

SoST RAGS Seminar, Dept. of Social Statistics, University of Manchester *Jul 2025 · Manchester*

Geneva Health Forum, University of Geneva *May 2024 · Geneva*

Royal Statistical Society International Conference *Sept 2023 · Harrogate*

Postgraduate Summer Research Showcase, University of Manchester *Jun 2022 · Manchester*

GRANTS & AWARDS

Grassroots Training Fund, Alan Turing Institute — £2,000 *Jul 2025*
Co-organised workshop: 'Digital Twins: A Collaborative Workshop for Practical Application and Knowledge Exchange.'

Enrichment Student Funding, Alan Turing Institute — £1,000 *Jun 2025*
Oxford Machine Learning Summer School (MLx Generative AI).

ELLIS Summer School Scholarship, University of Manchester — £500 *Jun 2024*
Machine Learning for Healthcare and Biology.

Student Bursary, Manchester Jean Monnet Centre of Excellence — £800 *May 2024*

Fieldwork Bursary, School of Social Sciences — £3,000 *Nov 2022*
Funded primary data collection for online RCT (Prolific).

PhD Fellowship, ANID (Chilean National Research and Development Agency) *Sept 2021*
Fully-funded four-year doctoral fellowship, awarded competitively.

Master's Fellowship, ANID *Oct 2020*
Fully-funded master's fellowship, awarded competitively.

SERVICE & OTHER

PGR Student Representative, University of Manchester *Sept 2023 – Sept 2024*

Social Stats Hackathon 2023 Organiser, University of Manchester *Jul – Sept 2023*

Entrepreneurial Project: TRAILACADEMY.RUN *Jul 2024 – Present*

- Designed and validated TRAILACADEMY.RUN Digital Twin, an AI-driven service using digital twin modelling for trail runner performance optimisation.
- Developed a proof-of-concept for Training Stress Score (TSS) modelling using neural networks (Keras/TensorFlow, Google Colab).

TECHNICAL SKILLS

Methodologies: Causal Inference (Transportability/Generalisability, G-computation, AIPW), Doubly Robust Machine Learning (BART, Gradient Boosting), Econometric Methods, Cost-Utility Analysis (QALYs), Microsimulation, Complex Survey Design & Analysis, Experimental Design, Longitudinal Data Analysis, Bootstrapping via HPC.

Software: R (primary), Python (Keras/TensorFlow), Stata, LaTeX.

REFERENCES

Dr. Yan Wang
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Dr. Nick Shryane
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