

CURRICULUM VITAE - DR. PATRICK BALLANTYNE

Postdoctoral Research Associate in Geographic Data Science

Website: <https://patrickballantyne.github.io>

RESEARCH INTERESTS

My research background is in the field of applied GIScience, where I leverage GIS technologies and spatial data to solve real world problems in the fields of **Transportation, Consumer Behaviour** and **Urban Planning**. I am passionate about developing academic research outputs that can be used to support effective decision-making in policy settings, and are underpinned by robust data, analyses and the core principles of GIScience. I am a highly collaborative researcher, who has significant experience of working with private and public sector organisations to generate tangible research impact and innovation.



EMPLOYMENT

- June 2022 - **Postdoctoral Research Associate**
Geographic Data Science Lab, University of Liverpool
- Mar. 2023 - **Spatial Data Consultant (Freelance)**
Liverpool City Region Combined Authority
- Jan. 2021 - **Data Scientist**
Apr. 2022 Consumer Data Research Centre

EDUCATION

- Sep. 2018 - **PhD, Geographic Data Science** (*examined March 2023, no corrections*)
Dec. 2022 Department of Geography and Planning, University of Liverpool.
- Sep. 2018 - **MSc, Data Analytics and Society** (*distinction*)
June 2020 Department of Geography and Planning, University of Liverpool.
- Sep. 2015 - **BSc, Physical Geography** (*1st class with honours*)
July 2018 Department of Geography and Planning, University of Liverpool.

RESEARCH

Peer-Reviewed Journal Articles (*citations = 84, h-index = 5*)

- 2025 Son, H., Jang, J., Park, J., Balog, A., **Ballantyne, P.**, Kwon, H.R., Singleton, A., Hwang, J. 2025. Leveraging Advanced Technologies for (Smart) Transportation Planning: A Systematic Review. *Sustainability*, 17 (5), 2245. <https://doi.org/10.3390/su17052245>.
- 2024 **Ballantyne, P.**, Filomena, G., Rowe, F., Singleton, A. 2024. Developing two-dimensional indicators of transport demand and supply at small area levels to promote sustainable transportation equity. *Computers, Environment and Urban Systems*, 113, 102179. DOI: <https://doi.org/10.1016/j.compenvurbsys.2024.102179>.
- Ballantyne, P.**, Singleton, A. 2024. Using composite indicators and city dashboards to promote place-based policy interventions. *Cities*, 154, 105329. DOI: [10.1016/j.cities.2024.105329](https://doi.org/10.1016/j.cities.2024.105329).
- Ballantyne, P.**, Berragan, C. 2024. Overture POI data for the United Kingdom: a comprehensive, queryable open data product, validated against Geolytix

supermarket data. *Environment and Planning B: Urban Data/Code Section*. DOI: [10.1177/23998083241263124](https://doi.org/10.1177/23998083241263124).

- 2023 Gibbs, H., **Ballantyne, P.**, Cheshire, J., Singleton, A., Green, M. 2023. Harnessing mobility data to examine changing work from home behaviours between censuses. *The Geographical Journal*. DOI: [10.1111/geoj.12555](https://doi.org/10.1111/geoj.12555).
- Ballantyne, P.**, Sanderson, R.K., Davies, A., Houlden, V., MacLachlan, A., Owen, G., Robinson, C., Shin, H., Wartmann, F.M., Wilkin, J. and Williams, I. 2023. 'There is no formula for life and career': A commentary on perspectives and experiences of early career quantitative human geographers. *The Geographical Journal*, 189 (1), pp.174-181. DOI: [10.1111/geoj.12499](https://doi.org/10.1111/geoj.12499).
- Ballantyne, P.**, Singleton, A., Dolega, L. and Macdonald, J. 2023. Integrating the who, what, and where of US retail center geographies. *Annals of the American Association of Geographers*, 113 (2), pp.488-510. DOI: [10.1080/24694452.2022.2098087](https://doi.org/10.1080/24694452.2022.2098087).
- 2022 **Ballantyne, P.**, Singleton, A. and Dolega, L. 2022. Using unstable data from mobile phone applications to examine recent trajectories of retail centre recovery. *Urban informatics*, 1 (1), p.21. DOI: [1007/s44212-022-00022-0](https://doi.org/1007/s44212-022-00022-0).
- 2021 **Ballantyne, P.**, Singleton, A. and Dolega, L. 2021. A regional exploration of retail visits during the COVID-19 pandemic. *Regional Studies, Regional Science*, 8 (1), pp.366-370. DOI: [10.1080/21681376.2021.1973548](https://doi.org/10.1080/21681376.2021.1973548).
- Ballantyne, P.**, Singleton, A., Dolega, L. and Credit, K. 2021. A framework for delineating the scale, extent and characteristics of American retail centre agglomerations. *Environment and Planning B: Urban Analytics and City Science*. DOI: [10.1177/23998083211040519](https://doi.org/10.1177/23998083211040519).
- 2019 **Ballantyne, P. 2019**. Book Review: An introduction to R for Spatial Analysis and Mapping (2nd Edition) *International Journal of Geographic Information Science (IJGIS)*. DOI: [10.1080/13658816.2019.1647541](https://doi.org/10.1080/13658816.2019.1647541).

Research Income (€750,916.91 total, £124,623.91 as PI)

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|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 2025 | Phase II: A Big Data Digital Twin of Mass Transit in Liverpool City Region for Smart, Equitable Mobility, £482,906.00, <i>Innovate UK</i> . | Co-I |
| | A+PTAL: Enhancing Transport Accessibility Through Inclusive Data Integration, £97,385.33, <i>Connected Places Catapult National Centre for Accessible Transport (ncat) Scaling Innovation Programme 2025</i> . | PI |
| | Visitor Economy-Public Transport Use Across the West Midlands' Evening Economy, £25,000.00, <i>West Midlands Growth Company</i> . | Co-I |
| 2024 | Maximising the Impact of Urban Digital Twins for Public Policy in Liverpool City Region, £4,896.58, <i>ESRC Impact Accelerator Account</i> . | PI |
| | Establishing a new cross-sector, collaborative agenda for data-driven transport planning in Liverpool City Region, £22,342.00, <i>Partnership Innovation Fund, University of Liverpool</i> . | PI |
| | Phase I: A Big Data Digital Twin of Mass Transit in Liverpool City Region for Smart, Equitable Mobility, £118,387.00. <i>Innovate UK</i> . | Co-I |

<i>Unsuccessful</i>	The Sustainability of British Retail Centres: A New Evidence Base and Stakeholder Recommendations, £118,941.00 (average reviewer score 5 / 6), <i>ESRC Secondary Data Analysis Initiative</i> , PI.	PI
	From Vulnerability to Viability: Designing Climate-Resilient Retail Spaces in City Centres, £234,964.00, <i>British Academy Knowledge Frontiers</i> , Co-I.	Co-I

Working Papers

<i>Under review</i>	Dolega, L., Ballantyne, P. , Singleton, A. <i>under review</i> . Transformation of British Retail Centres: Reconfiguration and Economic Performance in the Post-Pandemic Era. Target Journal: <i>International Review of Retail Distribution and Consumer Research</i> .
	Balog, A., Dolega, L., Mahabir, R., Williamson, P., Ballantyne, P. <i>under review</i> . Understanding Consumer Behaviour: A Geodemographic Approach to Retail Insights. Target Journal: <i>Geoforum</i> .
	Birkin, M., Ballantyne, P. , Bullock, S., Heppenstall, A., Kwon, H.R., Malleson, N., Yao, J., Zanchetta, A. <i>under review</i> . Digital Twins and AI for Healthy and Sustainable Cities. Target Journal: <i>Computers, Environment and Urban Systems</i> .
<i>In preparation</i>	Ballantyne, P. , Cabrera-Arnau, C., Garofani, G., Singleton, A. <i>in preparation</i> . Optimising New Pedestrian Infrastructure for Safer Cities: An Enhanced GIS-Multi Criteria Decision Analysis (GIS-MCDA) Approach. Target Journal: <i>Accident Analysis and Prevention</i> .
	Kwon, H.R., Ballantyne, P. , Balog, A., Jang, J., Son, H., Hwang, J., Singleton, A. <i>in preparation</i> . Purposes and Standards for Implementing Transport Network Digital Twins: A Systematic Literature Review and Stakeholder Consultation Exercise. Target Journal: <i>Urban Studies</i> .
	Flynn, M., Ballantyne, P. , Anderson, R., Singleton, A. <i>in preparation</i> . "Cha-Cha-Cha-Ching": Using consumer transaction data to understand the dynamics of cities during mega events. Target Journal: <i>Area</i> .
	Dolega, L., Ye, Z, Ballantyne, P. <i>in preparation</i> . Exploring the drivers of high street decline across the UK. Target Journal: <i>Journal of Retailing and Consumer Services</i> .

Conference Papers

2025	Singleton, A., Ballantyne, P. 2025. Mapping Compound Inequality: A Data-Driven Framework for Strategic Investment in the Liverpool City Region. <i>American Association of Geographers (AAG) Annual Meeting 2025</i> .
2024	Kwon, H., Ballantyne, P. 2024. Transforming Liverpool's Bus Network with Urban Digital Twins. <i>Alan Turing Institute Urban Analytics Annual Meeting, Glasgow, UK</i> .
	Ballantyne, P. 2024. "Cha-Cha-Cha-Ching": Using consumer transaction data to understand the dynamics of cities during mega events. <i>International Geographical Congress 2024, Dublin, Ireland</i> .
	Ballantyne, P. , Singleton, A., Filomena, G., Rowe, F. 2024. Using Urban Indicators to Deliver a Sustainable and Equitable Future for Liverpool City Region. <i>American Association of Geographers (AAG) Annual Meeting 2024</i> .
2023	Ballantyne, P. , Singleton, A. 2023. Accessibility Indices for Regional Transport Equity Assessments: The Case of Liverpool City Region. <i>GIScience Annual Conference 2023</i> . Abstract available at: https://osf.io/yhwrp .

2022 **Ballantyne, P.**, Singleton, A., Dolega, L. 2022. Evidence of structural, functional, and spatial inequalities in the post-pandemic recovery British retail centres. *RGS-IBG Annual Conference 2022*.

Ballantyne, P., Singleton, A., Dolega, L., Macdonald, J. 2022. Integrating the *who*, *what* and *where* of American retail centre geographies. *GIS Research UK (GISRUK) Annual Conference 2022*. Abstract available at: <https://zenodo.org/record/6410106#.ZEFYP87MK5c>.

2021 **Ballantyne, P.**, Singleton, A., Dolega, L., Macdonald, J. 2021. American Retail Centre Geographies: Centres, Characteristics and Catchments. *American Association of Geographers (AAG) Annual Meeting 2021*.

Ballantyne, P., Singleton, A., Dolega, L., Macdonald, J. 2021. American Retail Centre Geographies: Centres, Characteristics and Catchments. *RGS-IBG Annual Conference 2021*.

Ballantyne, P., Singleton, A., Dolega, A., Credit, K. 2021. A Framework for Delineating the Scale, Extent and Characteristics of American Retail Centre Agglomerations: The Case of Chicago Metropolitan Area during COVID-19. *GIS Research UK (GISRUK) Annual Conference 2021*.

2020 **Ballantyne, P.**, Singleton, A., Dolega, A. 2020. An updated measure of the 'e-resilience' of retail centres. *GIS Research UK (GISRUK) Annual Conference 2020*.

Conference Sessions

2024 "Geography and Data Science for Public Good: Data-Driven Evidence and Solutions to Social and Spatial Inequalities, AAG Annual Meeting 2024. Chair: **Dr. Patrick Ballantyne**, Co-Chairs: Prof. Rachel Franklin, Prof. Alex Singleton. Three sessions comprising 14 papers from the UK, USA & Europe.

2022 "The Future of Quantitative Human Geography", RGS-IBG Annual Conference 2022. Co-Chairs: **Dr. Patrick Ballantyne**, Dr. Rachael Sanderson. Two sessions, sponsored by the Quantitative Methods Research Group (QMRG) comprising papers from PhD students across the UK.

2021 "The Ups and Downs of a PhD and Beyond", RGS-IBG Postgraduate Mid-Term Conference. Co-Chairs: **Dr. Patrick Ballantyne**, Dr. Rachael Sanderson. One panel session, sponsored by the QMRG, comprising contributions and discussions from nine early-career researchers in the field of quantitative human geography.

Invited Presentations, Keynotes, Panels and Outreach Activities

2025 **Ballantyne, P.**, Cabrera-Arnau, C., Garofani, G., Singleton, A. 2025. *A New Pedestrian Infrastructure and Safety Toolkit for Liverpool City Region*. Liverpool City Region Combined Authority Spring Transport Advisory Group (TAG) Meeting, Liverpool, UK.

2024 **Ballantyne, P.** 2024. *Transforming Urban Living with AI and Digital Twins (panel)*. Alan Turing Institute Urban Analytics Annual Meeting, Glasgow, UK.

Ballantyne, P., Carrington, D., Hatchard, K., Wetherall, J., Vikhorev, K. 2024. *How Liverpool City Region is using AI and Digital Twins to address real-world challenges and create commercial opportunities (panel chair)*. Smart City Expo, Barcelona, Spain.

Kwon, H., **Ballantyne, P.** 2024. *Transforming Liverpool's Bus Network with Urban Digital Twins*. GDSL Wednesday Lab Meeting, Liverpool, UK.

Flynn, M., **Ballantyne, P.**, Anderson, R., Singleton A. 2024. Eurovision's economic impact in Liverpool: Insights for future large-scale events. *Heseltine Institute for Public Policy Brief*. Available at: <https://www.liverpool.ac.uk/media/livacuk/publicpolicyamppractice/pbseries3/PB315.pdf>.

2023

Ballantyne, P. 2023. *We need more spatial thinkers! Perspectives from a Postdoctoral Researcher*. University of Sheffield 'Applications of GIS' MSc lecture.

Gibbs, H., **Ballantyne, P.** 2023. *Demographics and Working from Home Geographies*. CDRC Geodemographics Showcase and Annual Partner Event, Oxford, UK.

Ballantyne, P., Singleton, A. 2023. *Generating Impact: Urban Indicators, Dashboards and Consumer Data Research*. CDRC-ESRC Showcase Event, UCL, UK.

Ballantyne, P. 2023. H3: *What is it? (and why should you be using it?)*. Pets at Home Data and Insights Weekly Meeting [virtual].

Ballantyne, P., Singleton, A. 2023. *What if? Evaluating potential decarbonization strategies for maritime cargo flows in Liverpool City Region*. Geospatial Data Science for Future Cities and Society: Focusing on Analysis of Digital Footprint Data, University of Seoul/Korean Research Institute for Human Settlements.

Ballantyne, P., Gibbs, H., Cheshire, J., Singleton, A., Dolega, L. 2023. *Mobility data: does it live up to the hype?* Quantitative Spatial Sciences (QuSS) Seminar Series, University of Bristol, UK.

2022

Ballantyne, P., Singleton, A., Dolega, L. 2022. *Using unstable data to examine recent trajectories of retail centre recovery*. Supporting Post Pandemic Recovery and Resilience Through New Forms of Data, University of Liverpool Exchange with Korean Research Institute for Human Settlements.

Ballantyne, P. 2022. Workshop: Retail and Geodemographics: A Spatial Data Science Approach. *CARTO Spatial Data Science Conference, Google HQ, New York*. Materials available at: <https://github.com/patrickballantyne/CARTO-SDSC2022>.

Ballantyne, P. 2022. *Who, what, where and how: a quantitative investigation of retail centre geographies*. Maynooth University Social Science Institute (MUSSI) and National Centre for Geocomputation (NCG), Republic of Ireland.

Ballantyne, P. 2022. Retail Indicators I. Identifying 'clone towns' across the UK. *CDRC Stories*. Available at: <https://data.cdrc.ac.uk/stories/retail-indicators-i-identifying-clone-towns-across-uk>.

2021

Ballantyne, P., Sanderson, R., Davies, A., Houlden, V., Maclachlan, A., Owen, G., Robinson, C., Shin, H., Wartmann, F., Williams, I., Wilkin, J. 2021. The Ups and Downs of a PhD and Beyond. *Panel Session at the RGS Postgraduate Mid-Term Conference, sponsored by the Quantitative Methods Research Group*.

2020 **Ballantyne, P.** 2020. Moving the lab home: changes to research and data resulting from COVID-19. *Resilient and Sustainable Cities Podcast*. Listen at: <https://open.spotify.com/episode/2OHngRBoOxoYMPxMzZ8N6c>.

Ballantyne, P. 2020. An approach to retail centre delineation based on graph structures and H3 geometries. *MethodsX Twitter Take-Over*.

Awards and Prizes

2024 Outstanding Contribution to Research (nomination), *School of Environmental Sciences Staff Awards 2024*.

2021 Robin Flowerdew Prize, 2021. *Best postgraduate paper in the "Future of Quantitative Geography" sessions at the RGS-IBG Annual Conference 2021*. <https://qmrg.github.io/blog/2021/10/12/Ballantyne-bio>.

PROFESSIONAL RESPONSIBILITIES

Journal Editorial Board

- Urban Informatics

Journal Peer Review

- Annals of the American Association of Geographers
- Applied Geography
- Cities
- Computers, Environment and Urban Systems
- Environment and Planning B: Urban Analytics and City Science
- International Journal of Geographic Information Science
- Journal of Infrastructure, Policy and Development
- Journal of Maps
- Journal of Place Management and Development
- Journal of Retailing and Consumer Services
- Journal of the Royal Statistical Society Series A: Statistics in Society
- Journal of Urban Design
- Nature Scientific Data
- Regional Studies, Regional Science
- Urban Informatics
- Urban Studies

Committees, Organisations and Professional Societies

- Exchange & Event Coordinator, KUDATA project visit to London & Liverpool (Jan. 2025).
- Exchange Coordinator, KUDATA project visit to Seoul & Busan (Sep. 2024).
- Postdoctoral Representative, SOES Sciences Research Strategy Group (Sep. 2022 – Jan. 2025).
- Exchange Coordinator, South Korea-UK Geospatial Data Science for Future Cities (June 2023).
- Exchange & Event Coordinator, UK-South Korea Post Pandemic Recovery and Resilience (Nov. 2022).
- Coordinator, Geographic Data Science Lab Brown Bag Seminar Series (June 2022 – Sept. 2024).
- Early Career Committee Member, GISRUUK Annual Conference 2022 (Apr. 2022).
- Postgraduate Representative, RGS-IBG Quantitative Methods Research Group (Sep. 2020 – Jun. 2022).
- University of Liverpool Representative, Centre for Doctoral Training "Buddy Scheme" (Sep. 2019 – Jun. 2022).

Research Assistants

- Giada Garofani (Sep. 2024 – present)
- Ákos Balog (June 2024 – Mar. 2025)
- Ruth Neville (Nov. 2024 – Jan. 2025)
- Rodgers Iradukunda (Nov. 2024 – Jan. 2025)

PhD Students

- Vyacheslav Wilks (Sep. 2023 – present)
- Cillian Berragan (Sep. 2019 – Dec. 2023)

TEACHING

- 2025 MSc Dissertation Supervisor, University of Liverpool
Supervising two students on the CDRC Master's Dissertation Scheme, with project partner Liverpool City Region Combined Authority.
- Exploring regional demand for supported living and extra care housing in Liverpool City Region
- Modelling sustainable transport accessibility for new housing developments in Liverpool City Region.
- 2024 MSc Dissertation Supervisor, University of Liverpool
Supervised one student on the CDRC Master's Dissertation Scheme, with project partner Liverpool City Region Combined Authority.
- Developing a geodemographic classification to inform neighbourhood-level investments to reduce place-based inequality.
- Instructor, Liverpool City Region Combined Authority (LCRCA)
Delivery of a four-day short course covering introduction to R, data visualisation, APIs, dashboards and time-series modelling. Course was taught to 10 policy analysts with differing levels of programming competency. Co-taught with Prof. Francisco Rowe.
- 2022 Teaching Assistant, Ritsumeikan University, Kyoto, Japan
Delivery of a 5-day 'Geographic Data Science for Urban Analytics' short course to undergraduate and master's students at Ritsumeikan University. Course was taught to students with the full range of programming and GIS competency. Co-taught with Prof. Alex Singleton.
- 2018 - 2022 Teaching Assistant, University of Liverpool
Supported teaching on various undergraduate and postgraduate courses, including Geographic Information Systems, Statistics for Social Scientists, Population Dynamics, Geographic Data Science, Study Skills and GIS, Research Skills, GIS for Human Geography and Human Geography Dissertation.
- 2021 Data Scientist, Consumer Data Research Centre
Developed an online tutorial for the CDRC – "Advanced GIS methods training: retail centres and catchment areas", comprising interactive workbooks and short videos.
- 2019 Teaching Assistant, Geospatial Training Solutions
Supported delivery of "Introduction to spatial data and using R as a GIS" – a one-day workshop, held at the University of Liverpool, and lead by Nick Bearman of Geospatial Training Solutions.

TECHNICAL SKILLS

R ***
QGIS ***
Python **
ESRI **
CARTO **
Podaris **
Google Colab **
GitHub and Version Control **
Docker *

SQL *

Amazon Web Services *

JavaScript *

*** Advanced, ** Intermediate, * Novice

SCIENTIFIC SOFTWARE, DATA AND TEACHING MATERIALS

- 2024 Point of interest data for the United Kingdom. *Data product to accompany Ballantyne and Berragan (2024)*. Data product available at: <https://data.cdrc.ac.uk/dataset/point-interest-data-united-kingdom>.
- R Training: Liverpool City Region. *Bespoke four-day training course developed with Prof. Francisco Rowe for LCRC policy analyst team*. Materials available at: <https://fcorowe.github.io/lcr-training/>.
- US Retail Centre Boundaries and Classification. *Data products to accompany Ballantyne et al. (2023)*. Data product available at: <https://data.cdrc.ac.uk/dataset/us-retail-centre-boundaries-and-classification>, and GitHub repository available at: <https://github.com/patrickballantyne/USRetailCentres>.
- 2022 Advanced GIS Methods Training: Retail Centres and Catchment Areas. *Interactive training course developed for the CDRC*. Materials available at: <https://data.cdrc.ac.uk/dataset/advanced-gis-methods-training-retail-centres-and-catchment-areas>.
- 2021 Retail Centre Indicators. *Indicators and catchments to accompany the latest iteration of the CDRC retail centre boundaries data product*. Data products available at: <https://data.cdrc.ac.uk/dataset/retail-centre-indicators>.
- 2020 Tidylodes. *An R package for extracting, processing and 'spatialising' data from the US Census Bureau's LODES database*. GitHub repository available at: <https://github.com/patrickballantyne/tidylodes>.

PERSONAL

Citizenship

United Kingdom / Republic of Ireland.

Location

Liverpool, England.

Other Details

Full UK Drivers Licence.

GCSE's: 10 A* - C (including English and Maths).

A-levels: ABB (Geography, Music, Biology).

(Updated 09/04/2025)