Supermarket **T**ransaction **R**ecords **I**n **D**ietary **E**valuation

the STRIDE study: validation against self-reported dietary intake

Victoria Jenneson, Darren Greenwood, Graham Clarke, Timothy Rains, Bethan Tempest, Becky Shute, Michelle Morris

The University of Leeds & Sainsbury's Plc (UK)

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Dietary assessment

Challenges

- Subjectivity
- Burden
- Costs

Need for new methods

- Objective
- Broad
- Harness Technology

New ways of working

- Cross-disciplines
- Partnerships

Dietary assessment is important for the study of associations between diet and health-related outcomes

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A systematic review of supermarket automated electronic sales data for population dietary surveillance

Victoria L Jenneson ✉, Francesca Pontin, Darren C Greenwood, Graham P Clarke, Michelle A Morris

Nutrition Reviews, Volume 80, Issue 6, June 2022, Pages 1711–1722,
https://doi.org/10.1093/nutrit/nuab089

Published: 05 May 2022

72 papers

1 validation study (+ 1 published since)

More validation needed

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Supermarket Transaction Records In Dietary Evaluation

Aim: *To quantify the agreement (and limits to agreement) between supermarket purchases and self-reported intake*

How well do transactions represent intake?

In what contexts can transactions be used for dietary monitoring?

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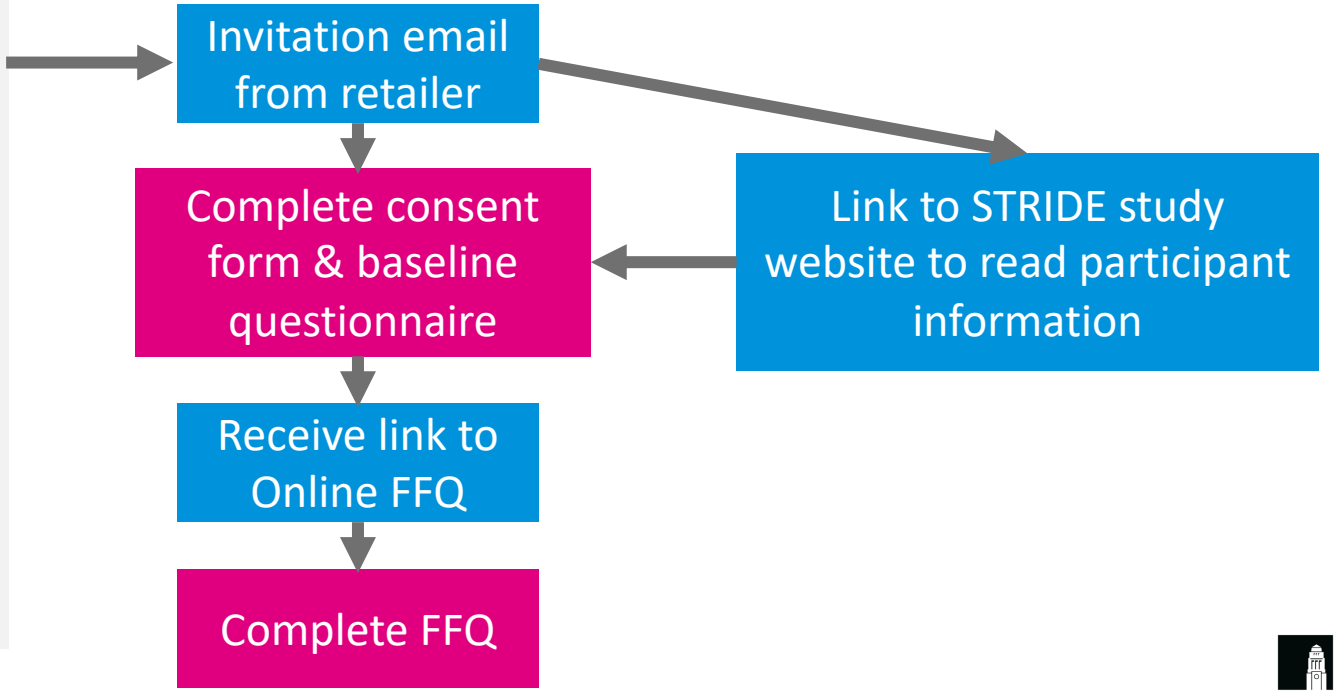
Participant journey

(n~45,000)

- **Loyalty card** holders (18+ years)
- **4 regions** in England (North, South, East- and West-Midlands)
- **Active** email
- **Opted in** to research communications
- '**Primary shoppers**' (2019)



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Data overview

Self report

Retail data

UK Energy intake recommendations

Recommended daily energy intake (kcal)		
Age (years)	**Female**	**Male**
0 – 1	698	745
1 – 3	1165	1230
4 – 10	1656	1861
11 – 17	1959	2449
18 – 64	1928	2532
65+	1855	2215

Transactions data

Agreement? (Bland-Altman)

Food Frequency Questionnaire
150-item semi-quantitative online FFQ

Baseline questionnaire

- Age
- Gender
- Household size
- Self-reported loyalty (% shopping with retailer)

nutrients/day
Energy (kcal), Total fat (g), Saturated fat (g), Protein (g), Total sugars (g), Sodium (mg)
(absolute and % of total energy)

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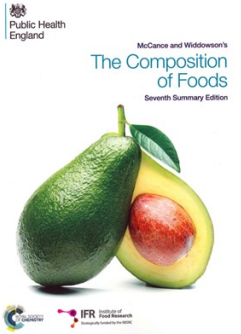
Nutrition data

FFQ

UK Food tables



Product nutrient composition

Back of pack

- Products sold 2019
- Own-brand & branded

72%

UK Food tables

- Fresh produce
- In-store bakery
- Alcohol
- Seasonal items

28%

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Study design

4% recruitment

		Pilot Spring	C1 Summer	C2 Autumn	C3 Winter	C4 Spring	
Baseline transactions (2019)	No data	Pilot transactions (March – May 2020)	Study period transactions (June 2020 – May 2021)				TOTAL
Number recruited		80	377	547	430	354	1788
Number with complete FFQ and transactions (analysis sample)		13	159	201	159	156	688
Cohort period		March - May 2020	June - Aug 2020	Sept - Nov 2020	Dec 2020 - Feb 2021	March - May 2021	
		Completion of baseline survey and FFQs					

16% completion

38% completion

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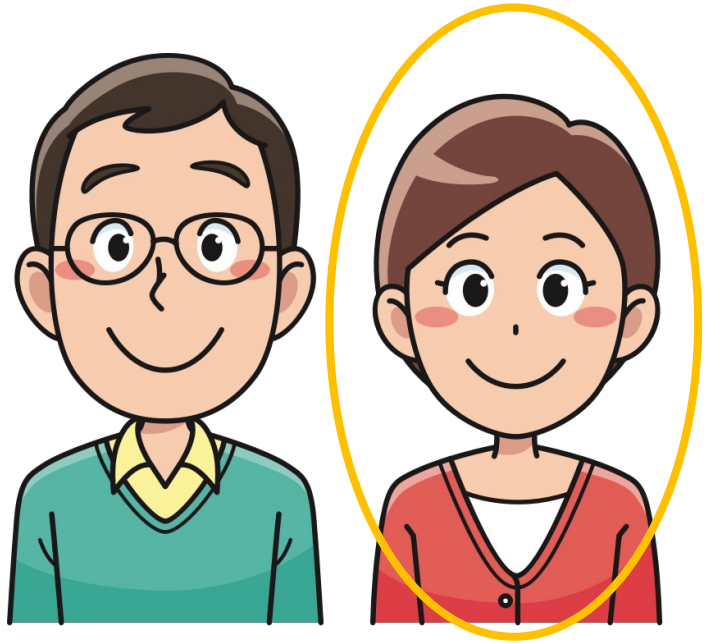
Participant characteristics

73% Female

Middle-aged/ older
(mean 56 years)

96% White ethnicity

Mean household size
2.3 persons



Relatively affluent
(63% in the 5 least deprived deciles)

Relatively loyal
(63% purchase 60%+ of their shopping from the retailer)

Absolute nutrient estimates from purchase records and FFQ (n = 686)

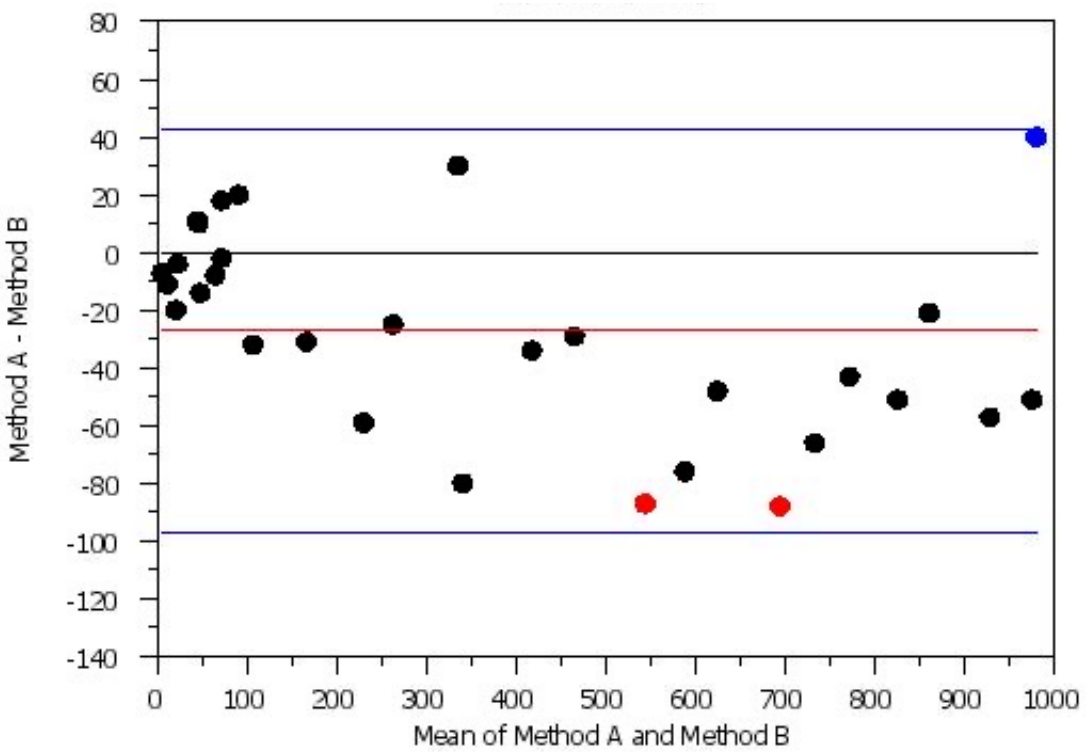
Nutrient	Absolute household purchase/day Median (IQR)	Absolute individual-level purchase/day Median (IQR)	Absolute consumption/day (FFQ) Median (IQR)
Energy (kcal)	**1746** (803, 3233)	**910** (371, 1621)	**1955** (1584, 2480)
Sugar (g)	**82** (35, 162)	**42** (17, 83)	**107** (83, 145)
Protein (g)	**65** (27, 117)	**33** (13, 60)	**83** (65, 104)
Total fat (g)	**72** (31,133)	**37** (15, 66)	**79** (61, 102)
Saturated fat (g)	**27** (12, 52)	**14** (6, 26)	**31** (23, 41)
Sodium (mg)	**1984** (781, 3661)	**1031** (403, 1892)	**2623** (2090, 3374)

Energy-adjusted nutrient estimates from purchase records and FFQ (n = 686)

Nutrient	Energy-adjusted purchase/day Median (IQR)	Energy-adjusted consumption/day (FFQ) Median (IQR)
Sugar (% energy)	**19** (16, 23)	**21** (18, 25)
Protein (% energy)	**14** (12, 16)	**17** (15, 19)
Total fat (% energy)	**36** (32, 41)	**37** (33, 40)
Saturated fat (% energy)	**14** (12, 16)	**14** (12, 16)
Sodium (mg/kcal)	**1.1** (0.9, 1.3)	**1.3** (1.2, 1.5)

~90%

Example Bland-Altman plot



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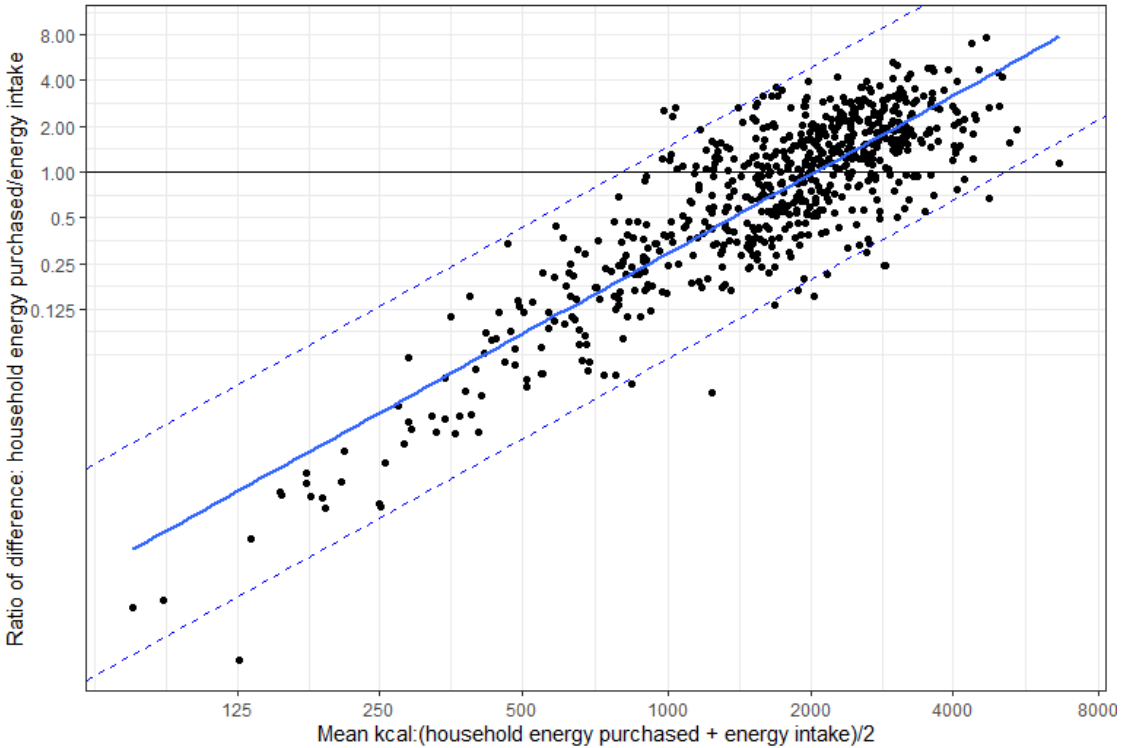
Agreement between household purchases and intake varies by magnitude



n=686

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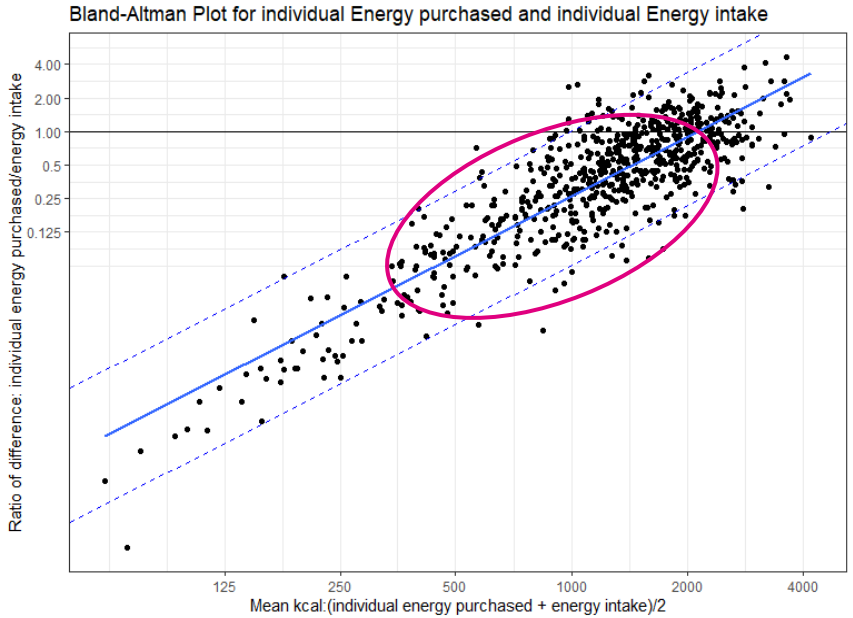
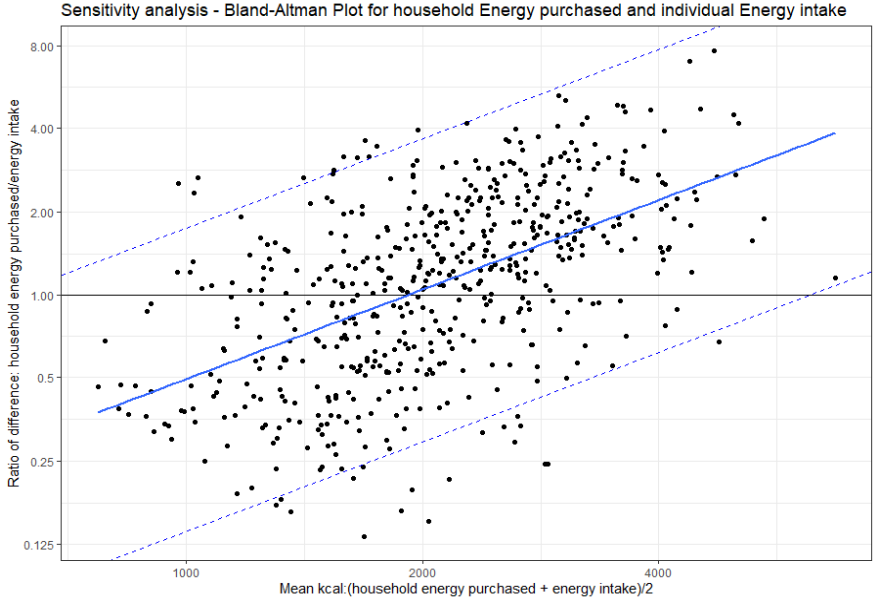
Extrapolating purchases to the individual level did not improve agreement

vs



vs



n=562 (excluding customers purchasing <500kcal/day)

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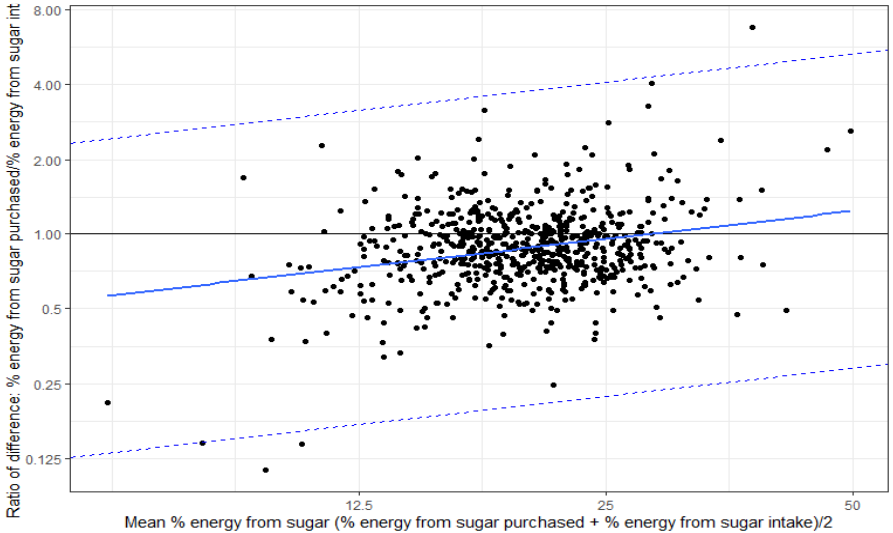
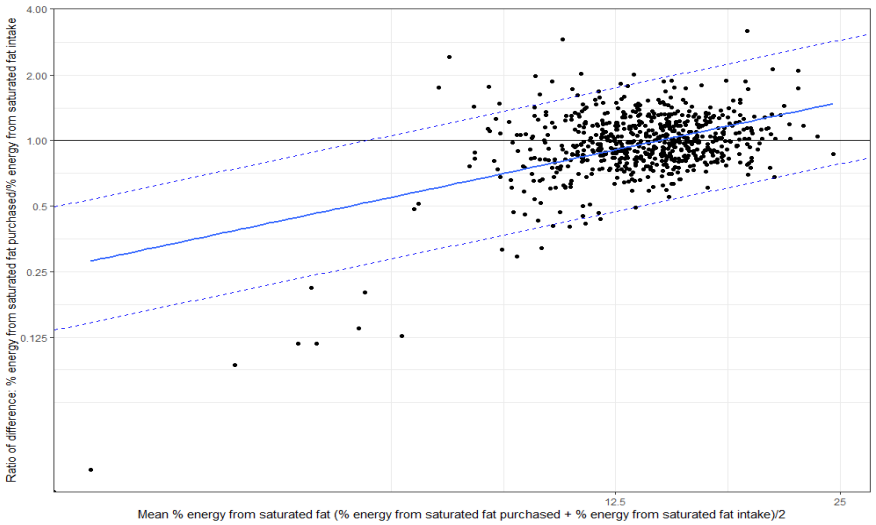
Relative nutrient purchases vs relative nutrient intake

% energy from **sugar**



% energy from **saturated fat**



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Conclusions

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How well do transactions represent intake?

Purchase data from a single retailer is a **poor proxy** of **absolute intake**

Stronger agreement for:

- **Single-person** households
- **Loyal** customers (sampling is important)
- **Energy**, **total fat**, **saturated fat**
- **Energy-adjusted** nutrient values

In what contexts can transactions be used for dietary monitoring?

In loyal customers, purchases are a **good proxy** for **dietary composition**

Future research?

Differences in agreement by:

- **Food group**
- **Demographic characteristics**

Defining well-characterised loyal **customer samples**

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Thank you for listening

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