



Mining relationships between food groups, eating time slots and diabetes status in adults from UK NDNS RP

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Introduction

- The timing of energy/nutrient intake has been previously shown to be associated with obesity and diabetes [1];
- Recently derived diurnal patterns of energy/carbohydrate intake suggested the potential interplay of circadian biology and social behaviour contributing to obesity [2];
- The relationship between food groups and the time when they are eaten is of interest, how such relationships vary by type 2 diabetes status are still left unknown.

Data and Methodology

- National Diet and Nutrition Survey Rolling Programme (NDNS RP, 2008-2017) included 6802 adults (2810 men and 3992 women) aged 19 or older in the UK, and their 749,026 food recordings collected by a 4-day-diary.
- Time of the day was categorized into 7 slots: 6-9 am, 9-12 noon, 12-2 pm, 2-5 pm, 5-8 pm, 8-10 pm and 10 pm-6 am.
- The derived contingency table between 60 food groups and the above 7 time slots were analyzed by Correspondence Analysis (CA). Biplots separately for the foods included in the food healthiness score tertiles, for all adults combined and separately by diabetes status.
- The odds ratio estimate was derived of consuming unhealthy food groups later in the day compared to earlier in the day, by logistic regression.

Table 1: Definition of Type 2 Diabetes.

Diabetes status	Self-reported	Glucose (mmol/L)	HbA1c (%)	n
No diabetes	No	< 6.10	< 6.5	2626
Pre-diabetes	No	6.10 ~ 6.99	--	133
Undiagnosed	No	≥ 7.00	≥ 6.5	99
Diagnosed	Yes	--	--	227
Missing	NA	NA	NA	3717

Results

Figure 1: Biplot for CA of 60 food groups and 7 time slots in NDNS RP, among non-diabetes.

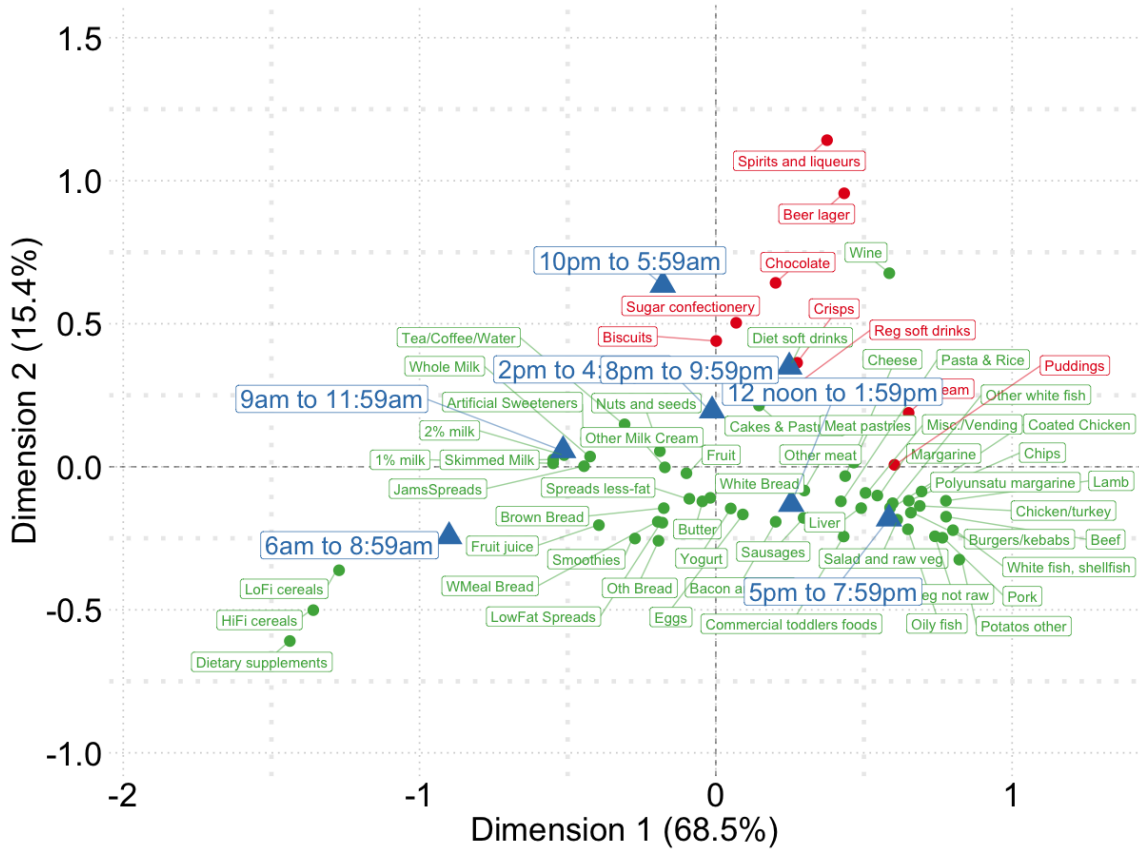


Figure 2: Biplot for CA of 60 food groups and 7 time slots in NDNS RP, among diabetes.

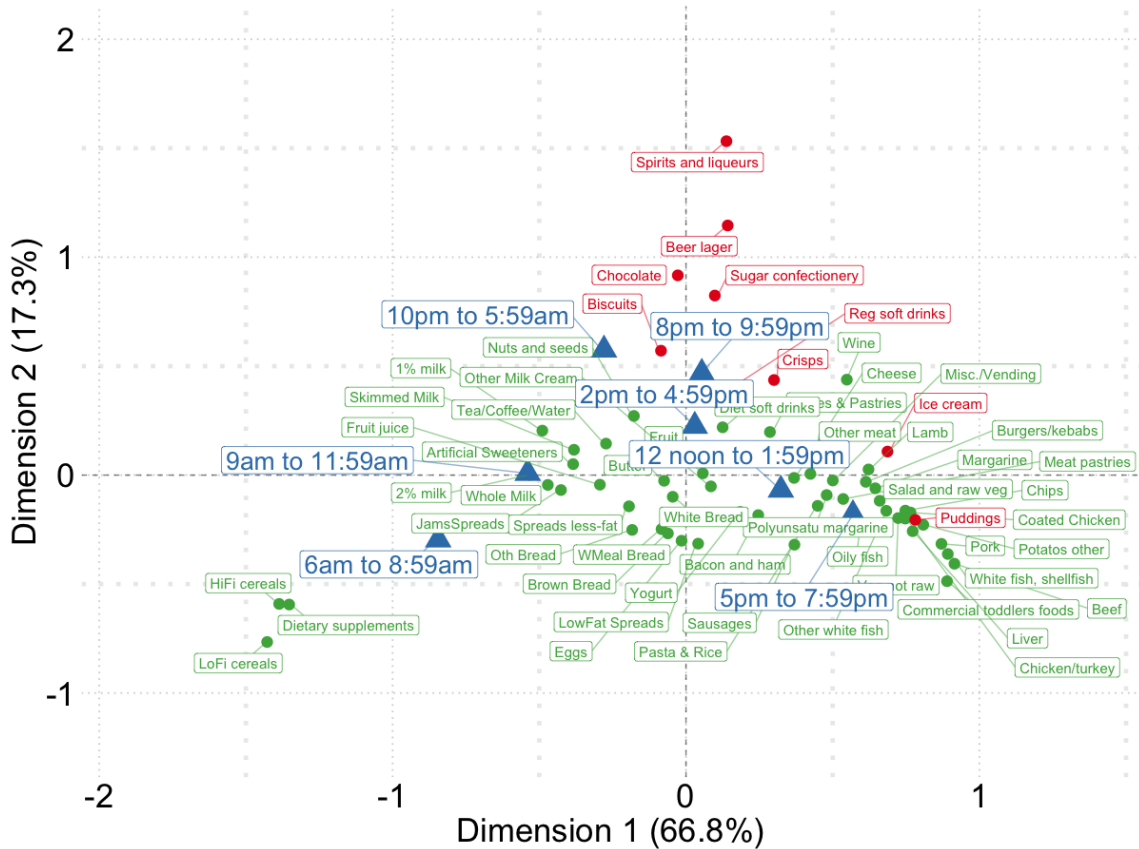


Figure 3: Biplot for CA of 60 food groups and 7 time slots in NDNS RP, among undiagnosed diabetes.

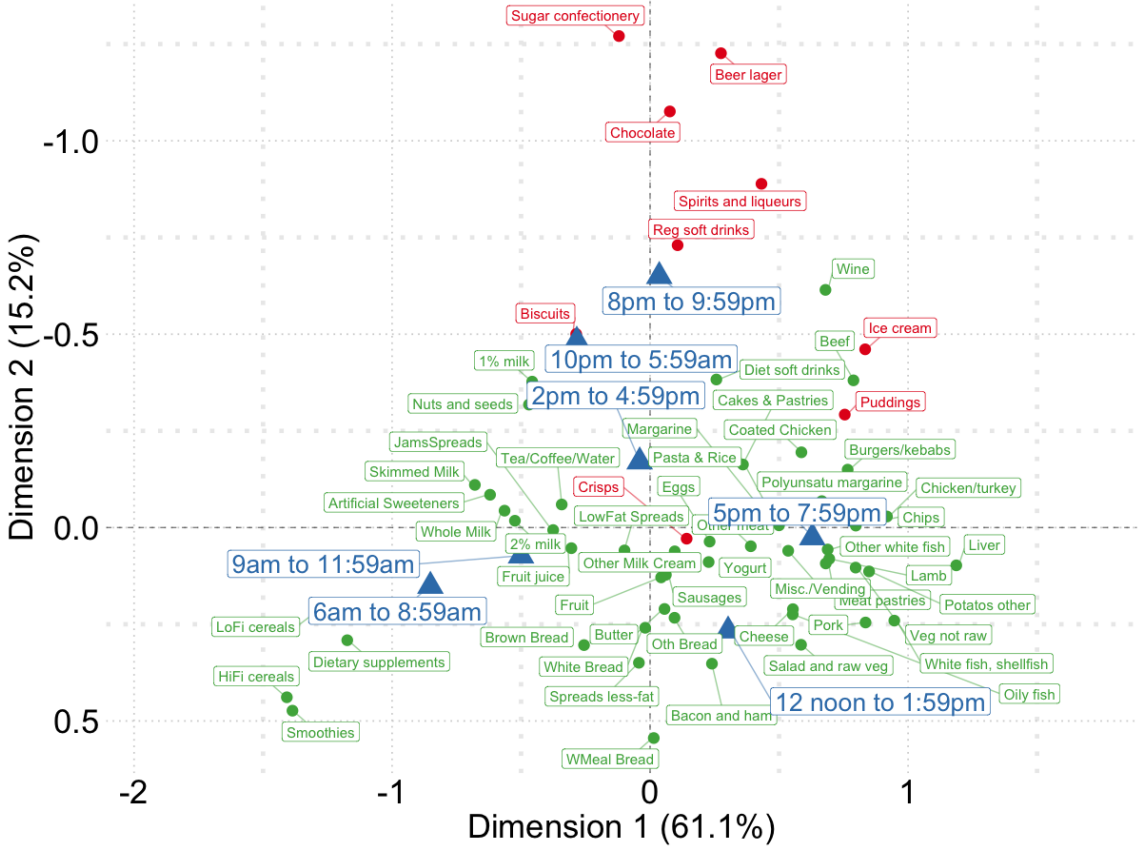
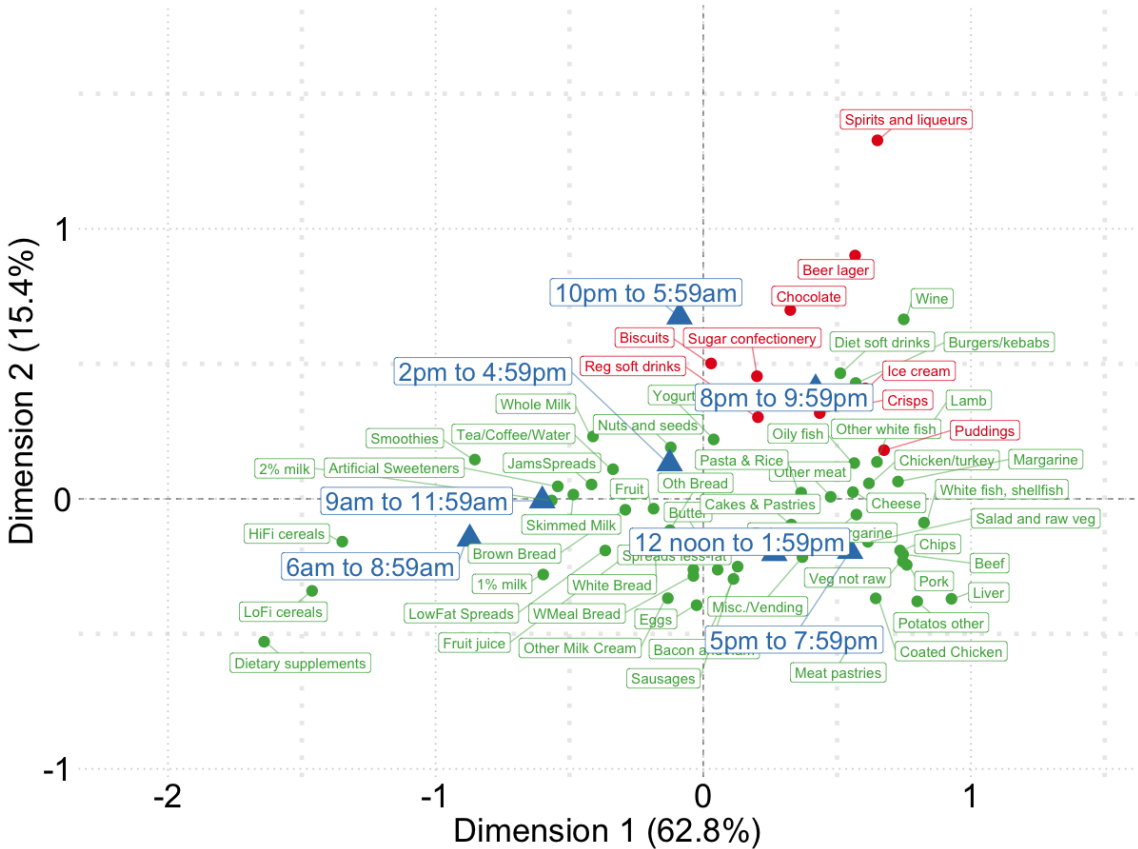


Figure 4: Biplot for CA of 60 food groups and 7 time slots in NDNS RP, among pre-diabetes.



Discussion

[1] S. Almoosawi, S. Vingeliene, F. Gachon, T. Voortman, L. Palla, J. D. Johnston, R. M. Van Dam, C. Darimont, L. G. Karagounis, Chronotype: Implications for Epidemiologic Studies on Chrono-Nutrition and Cardiometabolic Health, *Advances in Nutrition* 10 (1) (2018) 30–42.

[2] L. Palla, S. Almoosawi, Diurnal patterns of energy intake derived via principal component analysis and their relationship with adiposity measures in adolescents: Results from the national diet and nutrition survey rp (2008–2012), *Nutrients* 11 (2) (2019) 422.