

Investigating the impact of sedentariness on appetite control: A multilevel platform linking energy intake and energy expenditure.

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Investigating the impact of sedentariness on appetite control: a multilevel platform linking energy intake and energy expenditure



Background

- The objective of DAPHNE project is to develop a state-of-the-art breakthrough ICT platform for reducing sedentariness and unhealthy habits.
- Within the DAPHNE project our task is to provide data to develop virtual individual models, comprising the personal characteristics of an individual on a portfolio of health markers i.e. body composition, physical activity (PA) level, sedentary behaviour, appetite control, metabolism etc. within an energy balance framework.

Introduction

- Low energy expenditure (EE) and increased energy intake (EI) both contribute to obesity and weight management.
- Changing the level of PA influences the control of appetite (King et al. 2009).
- Approximately 30% of exercise induced EE is compensated for by an increase in EI (Stubbs et al. 2004).
- Conversely an imposed reduction in PA does not appear to be coupled with a reduction in EI to account for the reduction in EE (Blundell 2011).
- “Sedentariness” is more than just low EE, according to the Sedentary Behaviour Research Network (2012) it is any waking behaviour characterized by an energy expenditure ≤ 1.5 METs while in a **sitting** or **reclining** posture.
- We are examining the impact of “sedentariness” on appetite control under free-living conditions (outside the laboratory) to determine whether, under conditions of low EE the homeostatic control of food intake is weakened.

Aim

- Develop innovative techniques to interpret objectively measured PA.
- Track PA behaviour using continuous monitoring with SenseWear Armband technology (see table 1 for output).

Results – Data presented in this poster are from a feasibility study.

Table 1. Comparison of Armband data from 2 participants during a 24 hour period.

	Participant 1	Participant 2
Hours of Armband Data (hours:minutes)	23:15	23:22
Hours Offbody (hours:minutes)	0:45	0:38
Physical Activity Duration (hours:minutes)	6:11	2:52
Sedentary (hours:minutes)	17:03	20:30
Light (hours:minutes)	3:24	1:05
Moderate (hours:minutes)	2:19	1:46
Vigorous (hours:minutes)	0:29	0:01
Total EE (kcal)	2823	2737
Measured Active EE (kcal)	1568	826
Steps (per day)	15502	7372

*Sedentary time should be interpreted with caution as this parameter also includes sleep.

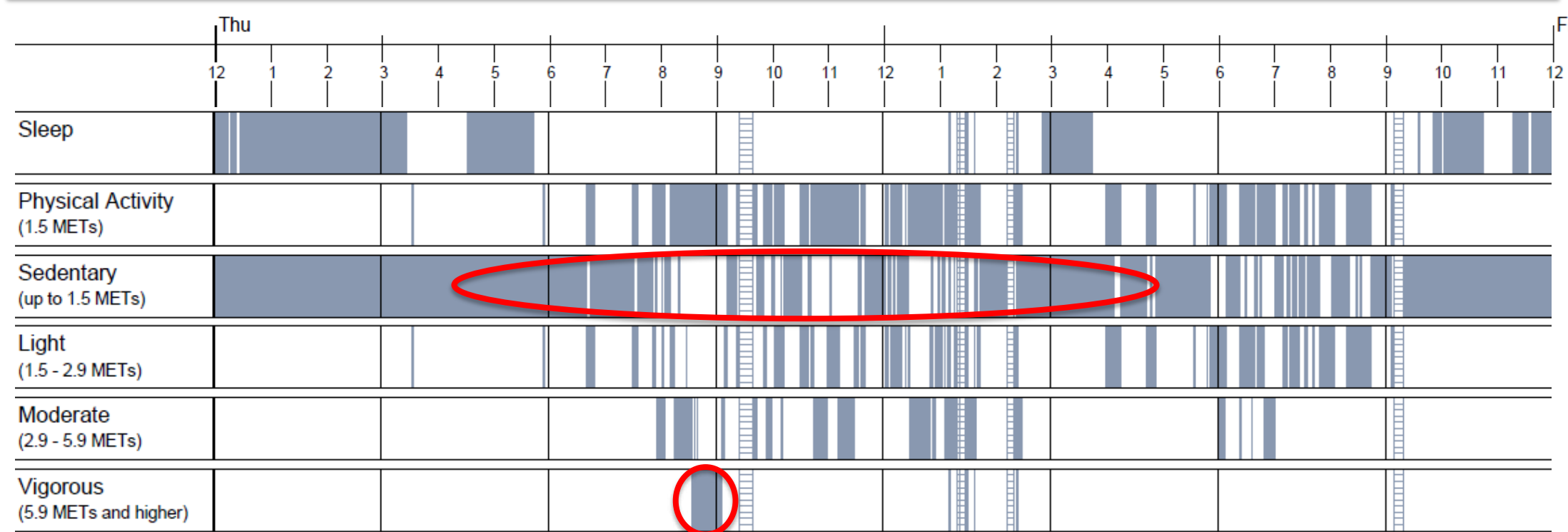


Figure 2. Participant 1 - 24 hour PA profile.



Figure 3. Participant 2 - 24 hour PA profile.

Discussion

- The SenseWear armband clearly distinguished between people with different profiles of activity and sedentary behaviour.
- In the example shown (table 1) both participants had similar **total energy expenditure**, but markedly different **active energy expenditure**.
- These categories of behaviours will be related to all measures shown in the multilevel platform to determine if specific behaviours are associated with greater risk to health, obesity or poor appetite control

Current work

- To provide data that will be used within the DAPHNE system implementing cloud technology and big data services.
- Explore the relationship between sedentariness and appetite control by implementing a 12 week supervised exercise intervention moving participants from an inactive to active state whilst assessing gut peptides, subjective appetite control and probe day energy intake.

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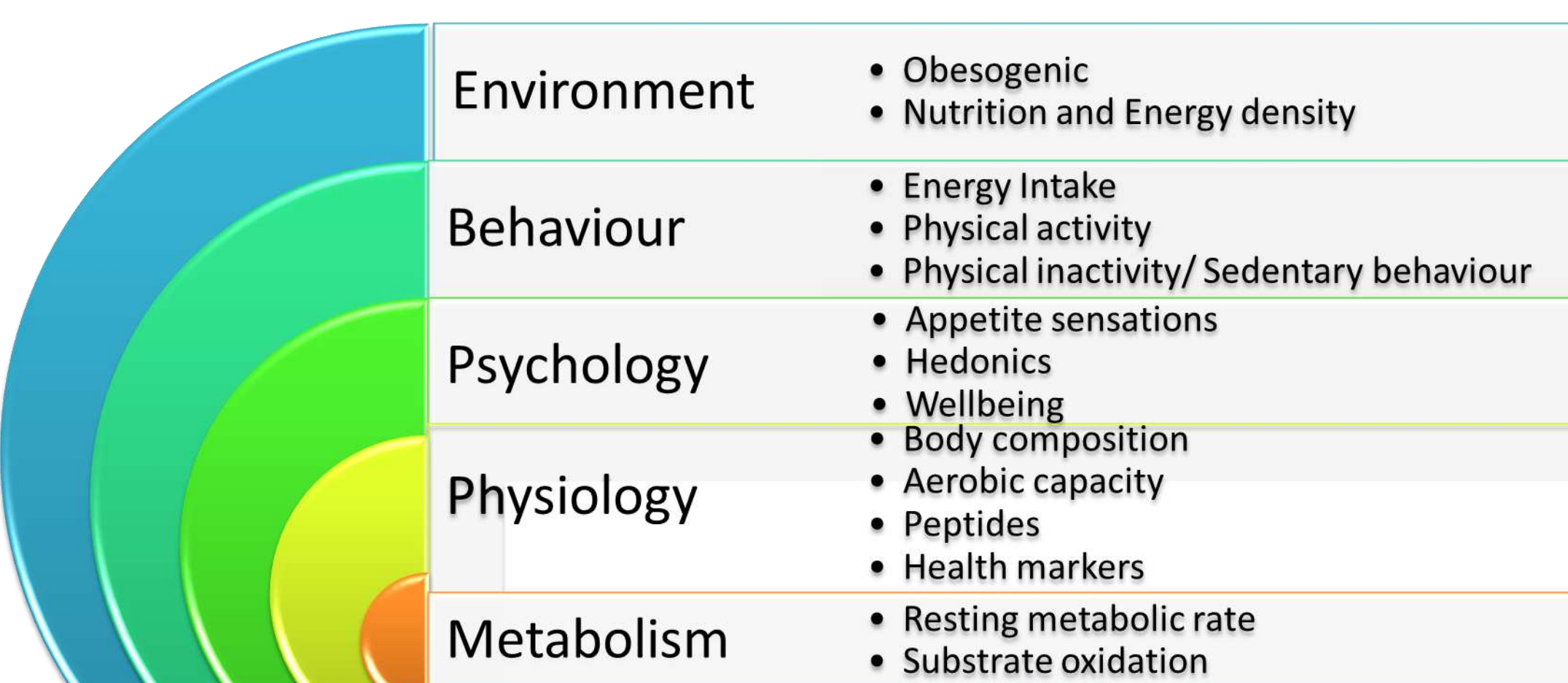
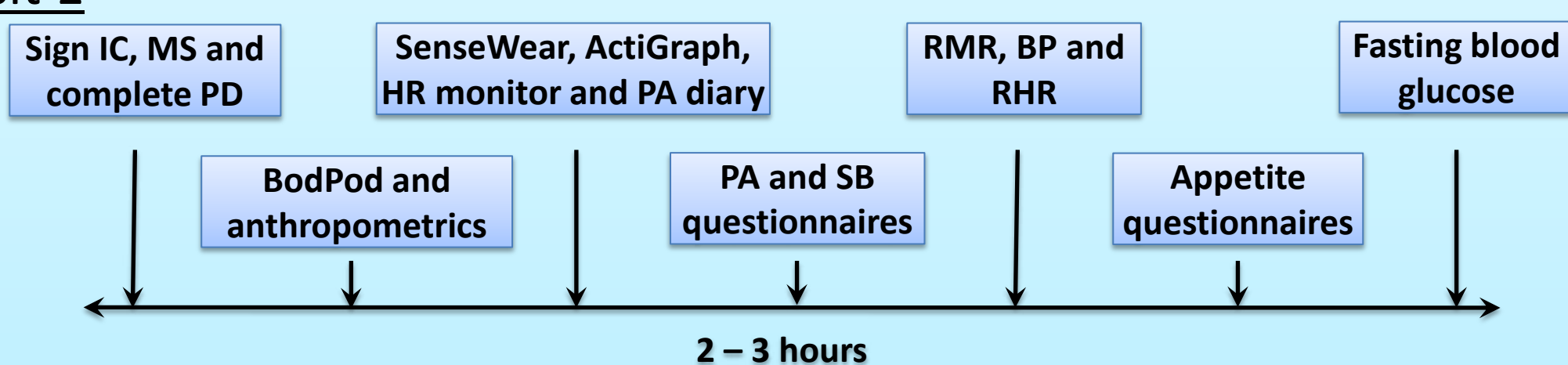


Figure 1. The Leeds multilevel systems approach to the study of appetite control.

Methods

Participants visit the Human Appetite Research Unit at the University of Leeds on two occasions.

Visit 1



Collect Armband data for 7 days

