

ESF Exploratory Workshop on  
**Exploring new directions for the assessment of dietary intake and physical  
activity levels**

**Durham City (United Kingdom), November 2009**

**Convened by:  
Prof Carolyn Summerbell**

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**SCIENTIFIC REPORT**

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## **1. Executive summary**

The workshop was held in the Lindesfarne Centre, St. Aidan's College, Durham University, which overlooks Durham City and its Norman Castle and Cathedral which together create a World Heritage Site. The workshop ran over three days, Wednesday 25<sup>th</sup> November from 5pm to Friday 27<sup>th</sup> November 2009 at 2pm and there were 15 participants from 8 countries. Away from the formal timetabled sessions, informal networking was facilitated over the lunchtime breaks as well as over the evening dinners at Durham Castle and Hatfield College.

The scientific objective of the workshop was to bring together a mix of key stakeholders across Europe (trying to ensure representation from all regions) to explore new directions, particularly those that use novel web-based and artificial intelligence based systems, to assess dietary intake and physical activity levels at a population level.

The original plan for the meeting was to ask delegates to provide expert commentaries on the current state of the art in their knowledge areas, and then to use these commentaries as a starting point for working groups to discuss and ultimately refine their ideas on how to drive the state of the art forward.

The ideas presented during the meeting were, although not an exhaustive list of measurement tools, an excellent summary of what was currently available and a useful basis for the working group and expert panel discussions.

During the meeting, despite each delegate having a different vision of what the ideal assessment method for dietary intake and physical activity levels might entail, a consensus was reached on the following key objectives from the workshop:

1. To set up an ESF research network in the area of novel assessment methods of dietary intake and physical activity levels, where the objectives of this research network should reflect those of the current workshop. This should be the next step taken (led by Prof Summerbell).

2. To set up a “Look-Out” group (led by Prof de Bourdeaudhuij) which would scope relevant past, present and future projects on assessment tools, and horizon scan possible research funding opportunities.
3. To create a CONSORT type statement for the measurement and reporting of dietary intake and physical activity, and to launch this at the International Conference on Diet and Activity Methods 2012 (ICDAM) in Rome (led by Dr Foster and Prof Lissner)
4. To carry out a systematic review which will examine novel assessment methods, and will contain a ‘state of the art’ section (for use in funding applications that are written). Dr Foster and Mr Kelly will look at the physical activity literature; Prof Lissner and Prof Adamson will contribute to the dietary intake literature.
5. To look into the creation of a “HEPA EUROPE” style ([www.euro.who.int/hepa](http://www.euro.who.int/hepa)) network for dietary intake.

The meeting concluded that methods for dietary intake and physical activity assessment are needed that are reliable, valid and fit-for-purpose; incorporate advancing technology; and can be used consistently throughout Europe. The current workshop provided much inspiration and a solid foundation for future work in this area. Plans were put in place for work to be carried out over the next five years that will bring together experts from throughout Europe and a range of disciplines, in particular those working at the cutting edge of technology development, to drive the state of the art forward.

## **2. Scientific content of the event**

### **Day 1 - Afternoon Session**

The workshop was opened by the convenor, Professor Summerbell, who welcomed all of the attendees and outlined the agenda for the following two days. A short presentation was then given on behalf of the European Science Foundation, as the official representative, Prof Carlberg, was unfortunately unable to attend.

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### **Day 2 - Morning Session 1**

#### **Novel Methods of Assessment of Dietary Intake and Physical Activity Levels**

The first presentation entitled *“Validation of Novel Methods of Assessment of Dietary Intake and Physical Activity Levels”* (Teesside University, UK) examined the difficulties in measuring and assessing dietary intake and physical activity. The parallels between diet and activity assessment were discussed, particularly the issues that surround recalling recent behaviour or a specific previous period, that dietary intake and physical activity behaviours are both influenced by cultural norms/public health messages, memory, estimation, and bias, and that they are both prone to measurement error. However, the speaker highlighted the critical importance of measurement issues, and introduced the group to the idea that “If you can’t count it, you can’t change it!” (Prof. Robinson, Stanford University). The importance of validity, reliability and choosing the correct method of measurement were also examined and discussed. The latter half of the presentation dealt with many of the issues surrounding validation, which included the need to a) choose an appropriate comparison method, b) conducting the method comparison/validation in same time frame, c) if not using a true gold-standard validation method, a good relationship with criterion must be ensured and d) use appropriate statistical techniques.

The next presentation titled *“The Synchronised Nutrition and Activity Program”* (Durham University, UK) discussed the development and implementation of a novel web based assessment tool for previous day recall of dietary and physical activity behaviours called SNAP (Synchronised Nutrition and Activity Program). The original aim was to produce a novel, simple, quick and engaging method of assessing energy balance related behaviours at the group/population level. In the first testing of the tool, time taken to complete the survey ranged from 15 to 40 minutes, affected predominantly by reading ability and internet connection speed, and all participants were able to complete the program. A brief discussion was held around the validation of the program debating the use of gold-standard versus method comparison techniques.

The final presentation of the first morning session was titled *“The Synchronised Nutrition and Activity Program for Adults”* (Durham University, UK) and examined the Synchronised Nutrition and Activity Program for Adults (SNAPA). SNAPA is a web-based program designed to collect data on previous day diet and physical activity simultaneously. The program was developed using many of the same principles of SNAP (previous presentation) and shares some characteristics, although on a whole, the appearance and layout is quite different as it is designed for use by adult groups. The presentation consisted of a demonstration of the program and results from evaluation work carried out to date. SNAPA shows reasonable agreement with other standard methods of diet and physical activity measurement (Multiple Pass Recall dietary interview and accelerometry), and work is currently being carried out to investigate agreement with more accurate methods (direct diet observation and combined heart rate/accelerometry), of which some preliminary results were presented. Further development is required to address a number of usability issues and so that the program is adaptable to updates in web-based technologies. However, SNAPA provides a useful example of web-based diet and physical activity measurement, which may be a more cost-effective, standardised, low burden and large reaching approach compared to existing methods.

## **Day 2 - Morning Session 2**

### **Novel Methods of Assessment of Dietary Intake/Physical Activity**

The first presentation of the second morning session was titled “*IPSAS – Interactive Portion Size Assessment System*” (Newcastle University, UK) and was related to the assessment of portion size. When developing IPSAS, the original challenge was to develop a dietary assessment method for use with children that would be an alternative to weighed diaries, increase participation and completion rates, and would reduce a) participant burden, b) data entry and coding and c) data manipulation/possible human error. IPSAS is a computer based portion size estimation tool using photographs, which is available for three distinct age groups, (preschool, 4-11 and 11-16) and is administered via a researcher led interview. This has been shown to be a viable alternative to using weighed intakes with children, and that it does increase completion rates and potential representativeness of study sample and it is innovative and engaging for children to use.

The second presentation titled “*Young Children’s Nutrition Assessment on the Web (YCNA-W): First Results*” (Ghent University, Belgium) explored the background of the development of the YCNA-W and also the feasibility of the use of such a tool. YCNA-W is an adapted version of the YCNA-C as an online 24-hour food recording tool which can be completed as a record or as a recall and it has been adapted to suit children’s dietary habits. The dietary patterns reported by those completing the paper and pencil record was similar to the dietary patterns of those completing YCNA-W but the presenter recognised that a stronger validation is required. The YCNA-W tool was well received by the users, but selection bias might have compromised generalisability.

The third presentation of this morning session was titled “*e-tona: a Mobile System for daily food recording for children and adolescents*” (University of Barcelona, Spain) examined the use of mobile devices (e.g. PDAs, mobile phones) in interventions. The principal task of the e-tona system is to record the patient’s daily food intake to assess the participant’s eating behaviour, and the records are used to help to change the participant’s eating behaviour during the intervention. The interface contains a library with more than 500 foods including the most common Spanish cooked plates, and food classification is illustrated by images of the food and the

corresponding traffic light colours (related to fat content). Sizes of servings were also considered, and the traffic light indicators change as the two parameters are taken into consideration; amount of fat per serving and the serving size. Participants (children and adolescents) found that the e-tona system was easy, fun and pleasant to use, and that their portability and immediacy was very advantageous.

The last presentation of the morning session titled “*A new technology for measuring our journeys: using SenseCam to investigate travel behaviour*” (University of Oxford, UK) asked why it was so difficult to measure travel/physical activity behaviours, and demonstrated how a new technology called SenseCam might be able to address some of these difficulties. The speaker showed how SenseCam has a unique ability to simultaneously measure and verify a) mode of travel, b) duration or time of travel and c) frequency of travel. The speaker concluded that SenseCam can be used in a public health setting to investigate travel behaviours, although did concede that more development and learning is required to fully discover the uses that this technology could have.

## **Day 2 - Afternoon Session**

### **Facilitated working group discussions**

The workshop divided into three groups and spent a period of time developing ideas on novel methods for measuring dietary intake and physical activity levels in three distinct age groups; Group 1: Children and Young People (0-18 years old); Group 2: Adults (18-65 years old) and Group 3: Older Adults (65+ years old plus).

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### **Day 3 - Morning Session 1**

#### **Working Group Feedback**

##### **Group 1: Children and Young People (0-18 years old)**

The group began their feedback to the workshop by suggesting that an application to the ESF to form a Research Network would be a good starting point. They suggested that we should initially identify those people that we might have missed off the invitation list to the workshop including experts such as Prof Cavazza (Teesside University). Discussions were held around who would be appropriate to invite to join the Research Network; agreement was found on the following types of people; an appropriately qualified statistician (public health and/or epidemiology background), a “cost-efficiency” person; users (i.e. those from the fields of a) intervention, b) evaluation and c) surveillance studies. The group stressed the importance in this field of work to have contacts with those that work at the cutting edge of technology development to ensure that plans are made to incorporate the technologies that will be available in 2, 5 and 10 years time.

It was suggested that between those attending the workshop we should consider and discuss using another word for “technologies” as this may give the wrong impression.

Currently work that is needed is

- a) A review of the existing attempts at novel technology and measurement instruments
- b) A systematic review, or examination, of the novel technologies currently being used across Europe

From this, a five year Research Network plan should be formed with the aim (the same as the workshop) to develop and validate a novel tool for measuring/investigating obesity related behaviours (food intake and dietary behaviours / sedentary and domains of movement within recommendations) within the public health context.

Suggested experts were: Goof Buijs (Health Promotion in Schools), Willem van Mechelen (HEPA / Sport), Alan Smeaton (Computers) and experts from Garmin, Nokia and Nintendo Wii

The group suggested that a CONSORT-like (<http://www.consort-statement.org/>) statement for measurement should be developed by the workshop attendees and launched at ICDAM 2012 or 2015 – relating to the “science of reporting”.

Two final points raised by this sub-group were around the leading of this work –

- a) Who has the capacity to bring all of the suggestions for development work together? There will be quite a lot of work just for the successful creation of a Research Network, but then even more work will be generated after that.
- b) An email mailing list should be created for the current ESF Workshop members to enable easy communication.

### **Group 2: Adults (18-65 years old)**

The group focused their attention on linking up with previous projects (e.g. EPIC) that may have already developed tools which could be adapted for our use.

Suggested people to contact were:

Prof Summerbell’s research group (Durham), MRC research group (Cambridge), Eastern European research groups (for diet and physical activity), Italy – nutrition research group and Industry – Garmin, Microsoft.

Policy – this should be linked up with WHO, HEPA Europe, and lobby for creation of a similar group to HEPA Europe for nutrition.

### **Group 3: Older Adults (65+ years old plus)**

The group stressed that the important point of any development suggested must include a novel measurement tool. An essential requirement is adapting the technology over the life course, which they suggested could be approached as work packages on each phase of the life course in a large research project.

Partners suggested: Prima Informatics Ltd and EfcoVal – co-ordinator might be useful, Experts on nutrition and aging (Lisette de Groot (epidemiologist), a psychologist – cognition and perception – no names suggested), EPICsoft, for statistical support, Thorhallur Halldorsson (Iceland) and for academic computer expertise, Marc Cavazza.

### **Day 3 - Morning Session 2**

#### **Future Directions for the Assessment of Dietary Intake and Physical Activity Levels: Strategic discussion on follow-up activities led by panel of experts (Hein Raat, Ilse de Bourdeaudhuij and Lauren Lissner)**

The panel led the discussion by asking all of the delegates to consider “where are we right now?” and it was agreed that we were currently in the middle of a two day exploratory meeting to examine new directions for the assessment of dietary intake and physical activity levels which had been very inspiring and that one outcome of this was to set up a research network in this area. The objectives of the research network should reflect those of the workshop: to explore new directions, particularly those that use novel web-based and artificial intelligence based systems, to assess dietary intake and physical activity levels at a population level. However every delegate had, to some degree, a different vision of what this might entail varying from a broad overview of energy intake/expenditure to a narrow assessment method, all of which would be appropriate depending on the goal.

A consensus was reached in that we should aim to develop something at a higher level of assessment and then develop this to become a more broad assessment tool. The development should take into account the differences that are found across Europe particularly with references to culture being considered.

The panel then quickly summarised all of the presentations from Day 2 and it was agreed that the ideas presented were, although not an exhaustive list of measurement tools, had given the delegates an excellent idea of what was available to work with.

The next question for discussion which was led by the expert panel was “What is the goal of the assessment tools?” which had been dissected during the afternoon of

Day 2 by three age specific groups (Children and Young People, Adults and Older Adults). It was agreed that while these different age groups posed separate challenges, there were many common challenges raised by each of the three working groups as well.

The panel then challenged every member of the workshop to consider “What do we want to do?”, and it was established that as the various processes are often slow to reach fruition, strands of work should be carried out in parallel. The matter of how the interested parties would facilitate the transition from ESF Workshop to Research Network was raised and the following steps were agreed on:

1. Write up ESF workshop report and submit to ESF.
2. Create an easy to remember, appropriate, name for the group. “EURO-PANDA” was suggested (EUROpean Physical Activity aNd Dietary Assessment”
3. Continued co-ordination by the ORB Research Group from Durham University led by Prof Carolyn Summerbell.
4. Representatives from international countries should become core organisers (ORB to suggest these)
5. Write and submit an application to the ESF Research Network Funding Stream in (likely to be) October 2010; call opens in July 2010.
6. A working group must be set up ready to start work in July 2010.

It was agreed that a “Look-Out” Group should be established which Prof de Bourdeaudhuij would lead and would consist of two parts:

1. To look at relevant past, present and future projects; information that is required includes the name of the project co-ordinator and the tools that they developed (sometimes they are developed as part of the project, and sometimes the development is the main aim of the project).
2. To look for possible grant proposals/funding opportunities .e.g. ESF EUROCORE announced five themes in December. Also to look at EU grant calls, DG Sanco, WCRF calls and Heart Foundation.

Prof de Bourdeaudhuij agreed to take full responsibility for part 1 above, but asked for volunteers to contact her to help with part 2.

A suggestion was made to create a CONSORT type statement for the measurement and reporting of dietary intake and physical activity, and to present/launch this at ICDAM 2012 in Rome. Dr Foster agreed to email a synopsis to Prof Lissner to get this started.

It was also agreed that a systematic review looking at novel assessment methods is required. Dr Foster and Mr Kelly suggested that they would look at the physical activity half of the literature and Prof Lissner and Prof Adamson would contribute to the dietary intake side of the literature. This will also contain a state of the art section which will be extremely useful in any funding application that is written. Volunteers will be needed for the reviewing, data extraction and writing processes associated with systematic reviewing.

The creation of a “HEPA EUROPE” style ([www.euro.who.int/hepa](http://www.euro.who.int/hepa)) network for dietary intake was suggested (if one doesn’t already exist). The general consensus was that although there was a similar group for food composition, one for dietary intake did not exist at this time and that there was a need for this.

### **3. Assessment of the results, contribution to the future direction of the field, outcome**

#### **A. Outcomes of the workshop**

The group assembled at this workshop agreed to apply for an ESF research networking programme grant. However, before we can do this a full needs assessment must be carried out, as well as

- a) Clarifying the aim and objectives of the network (which were suggested in draft form at the start of the workshop meeting);
- b) Creating the terms of reference of the network;
- c) Identifying who should be involved in the development of the proposal and which group would take ultimate responsibility for this;
- d) Identifying who should be invited to be involved in the network

The points above were discussed by the group, and the following aims and objectives agreed:

#### *i) Aim of the Research Network:*

- Perform a systematic examination of the existing novel technologies across Europe
- Needs assessment (capacity building, range of organisations – WHO, HEPA, EU platform, etc)
- Improve reporting conventions for the science

#### *ii) Aim of the Research Project:*

- Identify, develop and evaluate novel technologies (content and tools) to improve the measurement of diet and physical activity
- Use these novel tools to investigate obesity related behaviours within a public health context across Europe
- Adapt these tools to be fit for purpose, (evaluate change [outcome], risk factor epidemiology [determinants], surveillance), age group and country
- Harmonise / Standardise

A wish list was developed for a tool that will be developed to assessment of dietary intake and physical activity levels. The important characteristics of such a tool were extensively discussed and agreed upon as follows:

- Easy to apply
- Low respondent burden
- Language barrier
- Quick to analyse
- Sensitive to detect change
- Long battery life
- Low cost
- Reduced measurement error
- Econometric measure

#### **B. Action Plan For Future Work:**

1. To set up an ESF research network in the area of novel assessment methods of dietary intake and physical activity levels, and that the objectives of the research network should reflect those of the current workshop. This should be the next step taken with a working group set up and ready to start work in July 2010. (led by Prof Summerbell).
2. To set up a “Look-Out” group (led by Prof de Bourdeaudhuij) which would look at relevant past, present and future projects on assessment tools and to look for possible grant proposals/funding opportunities.
3. To create a CONSORT type statement for the measurement and reporting of dietary intake and physical activity, and to launch this at the International Conference on Diet and Activity Methods 2012 (ICDAM) in Rome (led by Dr Foster and Prof Lissner)
4. To carry out a systematic review which will examine novel assessment methods, and will contain a ‘state of the art’ section (for use in funding applications that are written). Dr Foster and Mr Kelly will look at the physical activity literature; Prof Lissner and Prof Adamson will contribute to the dietary intake literature.
5. To look into the creation of a “HEPA EUROPE” style ([www.euro.who.int/hepa](http://www.euro.who.int/hepa)) network for dietary intake. To invite people to join the network, particularly Slovenia, Bosnia, Hungary, Poland and Lithuania via Prof Brazdova, and also representatives from Portugal and Italy via Dr Manios and Prof Saldana.

## 4. Final programme

### Wednesday 25<sup>th</sup> November 2009

*Lindesfarne Centre, St Aidan's College, Durham*

- 18.30-18.40**    **Welcome** by Prof Carolyn Summerbell (Workshop Convenor)
- 18.40-19.00**    **Presentation of the European Science Foundation (ESF)** by Prof Carsten Carlberg  
(ESF Standing Committee for the EMRC)
- 19.30**            **Social event:** *Formal dinner at University College (The Castle)*

### Thursday 26<sup>th</sup> November 2009

*Lindesfarne Centre, St Aidan's College, Durham*

- 08.30-09.00**    *Refreshments*
- 09.00-09.20**    **Welcome by Convenor** Prof Carolyn Summerbell (Durham University)
- 09.20-09.40**    **Brief Introductions**
- 09.40-10.40**    **Morning Session 1: Novel Methods of Assessment of Dietary Intake and Physical Activity Levels (Teesside and Durham)**
- 09.40-10.10**    **Assessment of reliability and validity/design methodology;** Prof Alan Batterham (Teesside University)
- 10.10-10.25**    **The Synchronised Nutrition and Activity Program;** Prof Carolyn Summerbell (Durham University)
- 10.25-10.40**    **The Synchronised Nutrition and Activity Program for Adults;** Prof Carolyn Summerbell (Durham University)
- 10.40-11.15**    *Refreshments and networking break*
- 11.15-12.15**    **Morning Session 2: Novel Methods of Assessment of Dietary Intake and Physical Activity (Newcastle, Ghent, Barcelona and Oxford)**
- 11.15-11.35**    **IPSAS: an interactive computer based portion size assessment system;** Prof Ashley Adamson (Newcastle University)
- 11.35-11.55**    **Fruit and vegetable consumption in Flemish preschoolers: results from a web based dietary assessment instrument;** Dr Carine Vereecken (Ghent University)
- 11.55-12.15**    **e-tona: a Mobile System for daily food recording for children and adolescents;** Prof Carmina Saldana (University of Barcelona)
- 12.15-12.35**    **A new technology for measuring our journeys: using SenseCam to investigate travel behaviour;** Mr Paul Kelly (University of Oxford)
- 12.45-14.00**    *Lunch and networking*
- 14.00-18.00**    **Afternoon Session 1: Discussion of Presentations within Working Groups**
- 14.00-18.00**    Facilitated working group discussions (Facilitators: Prof Ashley Adamson, Dr Charlie Foster and Prof Janet Cade)
- 19.30**            **Social event:** *Formal dinner at Hatfield College*

## Friday 27<sup>th</sup> November 2009

*Lindesfarne Centre, St Aidan's College, Durham, UK*

**08.30-08.45** *Refreshments*

**08.45-12.45 Morning Session 1: Working Group Feedback**

Yannis Manios (on behalf of Janet Cade), Charlie Foster and Ashley Adamson

10.15-10.45 *Refreshment break*

**10.45-14.00 Morning Session 2: Future Directions for the Assessment of Dietary Intake and Physical Activity Levels**

**10.45-12.45 Strategic discussion on follow-up activities led by panel of experts**

**Chair:** Ilse De Bourdeaudhuij (Ghent University)

**Panel:** Lene Frost Andersen (University of Oslo), Lauren Lissner (University of Gothenburg) and Hein Raat (Erasmus MC-University Medical Center)

12.45-13.30 *Lunch and informal discussions*

**13.30-14.00 Summary and closing;** Prof Carolyn Summerbell (Durham University)

**14.00** *End of Workshop and departure*

## 5. Final list of participants

Carolyn SUMMERBELL, Durham University, UK

Alan BATTERHAM, Teesside University, UK

Ashley ADAMSON, University of Newcastle, UK

Janet CADE, University of Leeds, UK

Charlie FOSTER, University of Oxford, UK

Ilse DEBOURDEAUDHUIJ, Ghent University, BE

Berit HEITMANN, University of Copenhagen

Paul KELLY, University of Oxford, UK

Lauren LISSNER, University of Gothenburg, SE

Yannis MANNIOS, Harokopio University, GR

Hein RAAT, Erasmus MC – University Medical Center, NL

Carmina SALDANA, University of Barcelona, ES

Carine VERECKEN, Ghent University, BE

Zuzana BRAZDOVA, Masaryk University, CZ

Alexandra KOUMPITSKI, Harokopio University, GR

## 6. Statistical information on participants

A total of 13 participants, one observer and one invited speaker attended the workshop (10 female, 5 male). The countries of origin were: the UK (n=6, including invited speaker), the Netherlands (n=1), Belgium (n=2), Sweden (n=1), Denmark (n=1), Spain (n=1), Czech Republic (n=1) and Greece (n=2, including observer).