Determinants of Diet and Physical Activity; Knowledge Hub to integrate and develop infrastructure for research across Europe

DEDIPAC
Final Report
2016

Project title: Determinants of Diet and Physical Activity; Knowledge Hub to integrate and develop infrastructure for research across Europe

Acronym: DEDIPAC KH

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Foreword

DEDIPAC stands for Determinants of Diet and Physical Activity, the topic that was and is being addressed by the DEDIPAC Knowledge Hub, i.e. by the scientists brought together in this first joint action of the Joint Programming Initiative (JPI) a Healthy Diet for a Healthy Life (HDHL). The focus on the determinants of crucial health behaviours – i.e. on the reasons why people engage in unhealthy eating, too much sitting and not enough physical activity, and thus on the 'causes of the causes' of the enormous burden of non-communicable disease - is urgent and important. Only with more insight in these causes of the causes can effective interventions and policies be developed and implemented to promote healthier lifestyles. DEDIPAC also stands for dedication: this final report shows that DEDIPAC delivers what we envisioned and promised, thanks to the strong consortium and their dedication to further this important field of research.

Over the past three years, DEDIPAC has:

1) Built a network of and supported collaboration among researchers, many of whom had not worked together before DEDIPAC. This network is now a firm basis for, and can be a stepping-stone towards, a long lasting infrastructure of scientists across Europe;
2) Made important steps for further harmonization of measurement and monitoring of dietary, physical activity and sedentary behaviours across Europe;
3) Provided a state-of-the-art overview of the present-day evidence regarding the determinants of these behaviours in different age groups by means of series of systematic reviews, frameworks, and secondary data analyses;
4) Translated these overviews –enriched by extensive interaction with international experts in the field- into conceptual models and frameworks to inspire future research agendas;
5) Provided an overview of evidence-based best practices for the evaluation of policies and complex interventions to promote healthier lifestyles;
6) Built online toolboxes to facilitate researchers, practitioners and policy makers in making evidence-based choices regarding measurement and monitoring of the health behaviours as well as for policy evaluations.

In short, DEDIPAC has delivered, and has thus created a strong basis to inform health promotion practice and policy makers. It provides solid ground for future research to gain further insights in the causes of the causes of unhealthy dietary habits, lack of physical activity and too much sitting, as well as in opportunities for meaningful evaluations of policies and complex interventions. We thank the different organisations across Europe that made this endeavour possible, as well as the JPI HDHL for their guidance and support. We hope and expect that the vision to focus on the causes of the causes will receive further support and that new joint actions will be built upon the DEDIPAC foundation, for which we provide recommendations at the end of this report.

Prof. Johannes Brug, DEDIPAC coordinator

Photo: Daniel Rommens

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List of abbreviations

DEDIPAC	DEterminants of DIet and Physical ACtivity
DMT	DEDIPAC Management Team
EU-PAD	EUropean Physical Activity Determinant
HDHL	Healthy Diet for a Healthy Life
ISBNPA	International Society of Behavioral Nutrition and Physical Activity
JPI	Joint Programming Initiative
KH	Knowledge Hub
SLR	Systematic Literature Review
SOS	Systems Of Sedentary behaviour
TA	Thematic Area
WP	Work Package

1. General objectives, achievements and developments

DEDIPAC Knowledge Hub

The DEDIPAC Knowledge Hub had five general objectives as described in the approved project proposal. The achievements and developments regarding these objectives are stated below.

A. Develop a network and infrastructure of researchers from different disciplines

Almost 300 researchers are listed as part of the DEDIPAC Knowledge Hub, from 68 research institutes in 13 European countries. The consortium counts researchers from at least 16 different scientific disciplines, from the biomedical fields and the social and behavioural sciences. Communication within the consortium was facilitated by the document exchange on the password protected 'Partner Portal' on the DEDIPAC website, and through live and teleconference meetings on the task, Work Package (WP), Thematic Area (TA), DEDIPAC Management Team (DMT), and full consortium levels. In addition, people from within DEDIPAC as well as outsiders were and are reached through the DEDIPAC website (www.dedipac.eu), twitter account (@JPI_DEDIPAC), monthly newsletters, and presentations at scientific and other meetings. The fact that, with very few exceptions, all Deliverables were delivered in time, and that DEDIPAC researchers will continue and are further planning to work together in subsequent research proposals and projects, are clear indications for the strength of the network.

B. Develop an online toolbox of best-practice and state-of-the-art methodologies

DEDIPAC has developed two toolboxes:

1) Toolbox on suitability of tools for research, surveillance and interventions (TA1 and 2)
2) Toolbox for development, evaluation and implementation of policies or multicomponent interventions on dietary, physical activity and sedentary behaviours (TA3)

The toolbox of TA3 has been online since early 2015 (https://www.dedipac.eu/toolbox/), but as it is a dynamic product it has developed and expanded since. In a next step, the information of TA1 and 2 will be added based on the input from Deliverables 1.1.1 (diet) and 1.2.5 (physical activity and sedentary behaviour). As the content of this toolbox is readily available, and the website design has already started, the aim is to have these components online early 2017.

C. Pilot test and optimize these infrastructures and methodologies

Novel, innovative instruments for (1) the assessment of sugar-sweetened beverage consumption in young adults (suitable for research purposes) and for (2) the assessment of sedentary behaviour and its determinants in youth (suitable for surveillance purposes) were developed and tested in multiple countries in TA1. In addition, the TA3 toolbox for the development, evaluation and implementation of public policies and multicomponent interventions was pilot tested in different steps. First, the TA3 partners evaluated the TA3 toolbox together with 5 stakeholders from each country involved in TA3. Second, the TA3 toolbox was pilot tested with the use of natural experiments. Partners that were conducting those natural experiments used the toolbox in developing, evaluation and/or implementing the natural experiments. Third, a consensus meeting was organised to reach consensus on the TA3 toolbox content and to formulate recommendations to optimise the toolbox. With the information coming from those three steps, the toolbox was optimised and finalised.

D. Establish a critical mass in this strategic research area

Activities that have facilitated the building of critical mass in this area include:

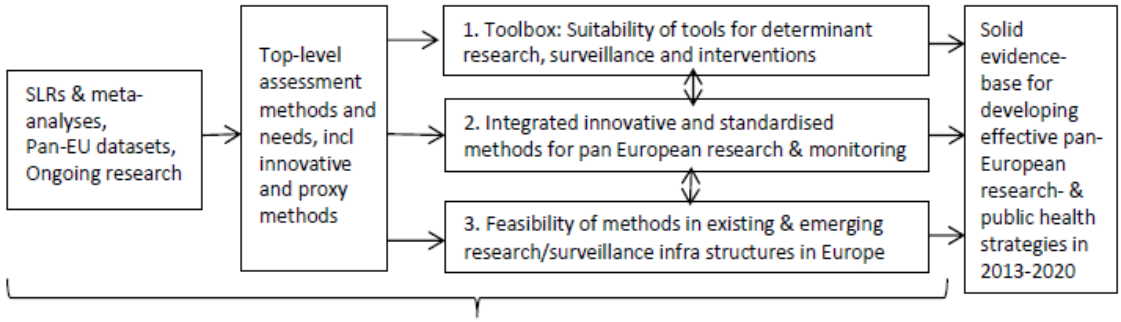
- Collaborations between researchers from different countries, research institutes and disciplines were established; many of whom never collaborated before DEDIPAC
- Various presentations at scientific as well as other meetings about DEDIPAC research
- Several workshops organized by and for the members of the DEDIPAC consortium
- A publicly accessible inventory of graduate programs within DEDIPAC institutes

E. Facilitate pan-European research efforts

DEDIPAC was present at the JPI HDHL conference in Brussels in 2015 and has been in close contact with other Joint Actions of JPI HDHL, such as ENPADASI and FOODBALL, discussing both practical (e.g. consortium agreement) and methodological (e.g. data harmonisation) issues. Over the last three years, the DMT supported 12 projects and grant proposals that further build on the Knowledge Hub and its content. In addition, efforts have been made to work towards the JPI HDHL policy evaluation call, as well as a pan-European cohort study.

Thematic Area 1

The overall objective of TA1 was "assessment and harmonisation of methods for future research, monitoring and evaluation of interventions". WPs within TA1 focused on dietary intake, dietary behaviour, physical activity and sedentary behaviour and aimed to provide the pan-European research community with a harmonised and coherent set of reliable and validated state-of-the-art measurement methods and their assessment tools to be used for future research of the individual, social and environmental determinants of dietary, physical activity and sedentary behaviours. These have been identified by means of an evidence-based and expert-lead overview of current and emerging assessment methodologies. The logic framework depicted below served to guide the activities in TA1 and to describe the achievements and developments during DEDIPAC.



Logic framework for the tasks in in TA1 "Assessment and harmonisation of methods for future research, surveillance and monitoring, and evaluation of interventions and policies".

TA1 was organised in three WPs. WP1.1 and WP1.2 addressed the 'assessment and harmonisation of assessment of *dietary intake and dietary behaviour'* (WP1.2) and of *'physical activity and sedentary behaviours'* (WP1.2). WP1.3 focused on *'pan-European harmonisation of research and surveillance regarding dietary and physical activity behaviours and their determinants'.* Using (systematic) literature reviews, secondary data analyses and by development and evaluation of (innovative) methods, these three WPs together contributed to the toolbox with stat-of-the-art methodology. To align activities within TA1, the TA-leader and WP-leaders and their deputies had 6-weekly telephone conferences. Specific attention was given to aligning the activities to enable incorporation of results into the toolbox. For incorporation of '*determinants of behaviour*' into the toolbox tasks were discussed and agreed upon between TA1 and TA2. Finally, the proposed design for the toolbox was discussed with TA3 at the TA3 consensus meeting (Amsterdam, April 2016).

The achievements of TA1 are briefly outlined below, starting with the collation of the evidence base, followed by key observations on the assessment methods, population groups and European diversity, and the approach to developing the roadmap. In line with the three topics in the logic framework above the (later) section on specific results integrates these methods and general observations into the three main achievements: toolbox, innovative assessment methodology, and roadmap towards pan-European surveillance.

Reviews and secondary data analyses

Systematic Literature Reviews. In TA1, a total of 18 Systematic Literature Reviews (SLRs) were conducted, 9 of these addressed diet[1], 8 addressed physical activity[2] and sedentary[3] behaviour, and one addressed determinants (Table 1). The SLRs addressed assessment methods and/or described the European diversity in behaviours, most of them according to population subgroups by age. As pan-European research methodology and heterogeneity of dietary, physical activity and sedentary behaviours was the overall scope of TA1, a general inclusion criterion for inclusion in SLRs was that they were conducted in two or more European countries (European Union countries as defined by the Council of Europe). For diet, study participants were required to be free-living, healthy populations of any age. For physical activity and sedentary behaviour, to be included, articles needed to report on observational studies conducted after 01-01-2000 (to avoid reporting outdated results) in the general, healthy population. With regard to physical activity, articles were included if they reported total physical activity (e.g. minutes/day or meeting recommendations), and/or physical activity in leisure time. Articles were included if they reported total sedentary time (e.g. minutes/day), time spent sitting at school, time spent on screen-time behaviours (e.g. television viewing, using a computer) and/or time spent at any other sedentary activity. Youth was defined as ≤18 years and adults >18 years. Both subjective (e.g. questionnaires) and objective (e.g. accelerometers) measures were included.

Secondary data analyses. For dietary behaviour and its determinants standardization of highly diverse datasets was not feasible and secondary analyses were conducted on the ProChildren and HELENA multicentre studies, covering 9 and 8 European countries, respectively. ProChildren data from 6th graders in nine European countries showed that irregular family breakfast meals were more prevalent in the northern region, compared to central region of Europe. Furthermore, irregular family dinner meals were less prevalent in northern and southern regions, compared to the central

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[1] Riordan F, et al. A systematic review of methods to assess intake of sugar-sweetened beverages among healthy European adults and children: a DEDIPAC (DEterminants of DIet and Physical Activity) study. Public Health Nutrition. 2016;21:1-20. doi: 10.1017/S1368980016002639.

Riordan F, et al. A systematic review of methods to assess intake of fruits and vegetables among healthy European adults and children: a DEDIPAC (DEterminants of DIet and Physical Activity) study. Public Health Nutrition. 2016;14:1-32. doi: 10.1017/S1368980016002366.

[2]Van Hecke L, et al. Variation in population levels of physical activity in European children and adolescents according to cross-European studies: a systematic literature review within DEDIPAC. Int J Behav Nutr Phys Act. 2016;13:70. doi: 10.1186/s12966-016-0396-4.

Loyen A, et al. Variation in population levels of physical activity in European adults according to cross-European studies: a systematic literature review within DEDIPAC. Int J Behav Nutr Phys Act. 2016;13:72. doi: 10.1186/s12966-016-0398-2.

[3] Verloigne M, et al. Variation in population levels of sedentary time in European children and adolescents according to cross-European studies: a systematic literature review within DEDIPAC. Int J Behav Nutr Phys Act. 2016;13:69. doi: 10.1186/s12966-016-0395-5.

Loyen A, et al. Variation in population levels of sedentary time in European adults according to cross-European studies: a systematic literature review within DEDIPAC. Int J Behav Nutr Phys Act. 2016;13:71. doi: 10.1186/s12966-016-0397-3.

region of Europe. Also, irregular family meal consumption was positively correlated with lower intakes of vegetables, and irregular family breakfast meals were correlated with more time spent on television viewing. Analyses based on the HELENA study indicated that breakfast consumption patterns vary by European region and gender, and is associated with weight status in males. Male breakfast skippers are more likely to be overweight/obese compared to breakfast consumers. Breakfast consumption also has an impact on daily macronutrient intake. The results suggest the need for gender specific interventions targeting healthy food choices at breakfast and morning snacks.

Table 1. Systematic Literature Reviews (SLRs) on assessment and European diversity of dietary behaviours and physical activity and sedentary behaviour and their determinants.

Topic of the SLR	**Population subgroup(s)**	**European diversity or assessment**
Dietary behaviours		
1. Sugar-sweetened beverages	Children, Adolescents, Adults	Assessment
2. Fruits and vegetables intake	Children, Adolescents, Adults	Assessment
3. Fibre intake	Children, Adolescents, Adults	Assessment
4. Folate van vitamin B12	Children, Adolescents, Adults, Elderly	Assessment
5. Meal pattern, frequency & timing	Children, Adolescents, Adults	Assessment
6. Meal pattern, intake distribution	Adults, Elderly	Assessment
7. Meal pattern, meal contents	Children, Adults, Elderly	Assessment
8. Dietary pattern, exploratory methods	Children, Adolescents, Adults	Assessment
9. Dietary pattern, diet quality	Adults, Elderly	Assessment
Physical activity and sedentary behaviour		
10. Prevalence of physical activity in youth	Youth (≤18 y)	Diversity
11. Prevalence of physical activity in adults	Adult (>18 y)	Diversity
12. Prevalence of sedentary behaviour in youth	Youth (≤18 y)	Diversity
13. Prevalence of sedentary behaviour in adults	Adult (>18 y)	Diversity
14. Validity, reliability and sensitivity of methods for physical activity measurement in adults	Adult (>18 y)	Assessment
15. Validity, reliability and sensitivity of methods for physical activity measurement in children and youth*	Youth (≤18 y)	Assessment
16. Validity, reliability and sensitivity of methods for sedentary behaviour measurement in adults	Adult (>18 y)	Assessment
17. Validity, reliability and sensitivity of methods for Youth sedentary behaviour measurement in children and youth*	Youth (≤18 y)	Assessment
*Determinants of diet, physical activity and sedentary behaviour***		
18. List of >300 diet determinants**		Assessment
19. Validity and reliability of 10 key determinants for diet*		Assessment
20. Validity, reliability, sensitivity and specificity of 11 key determinants for physical activity/sedentary behaviour**	< 18 years of age	Assessment

* These reviews were initially not planned, but added later to provide the toolbox with relevant data.

** These are not SLRs or papers but internal documents on the work conducted in TA2 to enable an inventory and expert-based prioritization of determinants

Secondary analyses of pan-European data was feasible for physical activity and sedentary behaviour (Table 2). The content of the analyses was guided by the availability of the data and their comparability between countries.

In one project, all data on approximately 45,000 youth with objectively measured physical activity and sedentary time are currently cleaned, reprocessed and reanalysed using a harmonised approach. This allowed direct comparability of the prevalence of physical activity and sedentary time in at least 18 European countries (including Norway and Switzerland). This is the largest harmonised data set to date comparing levels of physical activity and sedentary time and may provide useful information for policy makers and further large-scale population based intervention approaches. A short report was delivered by November 2016 and a full manuscript thereafter prepared.

Preliminary age-adjusted data suggest large heterogeneity in time spent in moderate and vigorous intensity physical activity ranging from about 35 minutes per day to 60 minutes per day on population level. Further, the data also indicate a South-North gradient with increasing prevalence of meeting physical activity recommendations of at least 60 minutes of moderate intensity physical activity every day by increasing Northern latitude.

In addition, population-based studies from four European countries (England, Norway, Portugal, Sweden) were pooled and harmonised to assess and compare objectively measured levels of physical activity and sedentary time in 9500 European adults. This study showed high levels of physical inactivity and sedentary time, with adults in Norway being most sedentary and adults in England being least physically active. Older people and obese people were at high risk for being inactive as well as being sedentary.

Table 2. Analyses of secondary data in pan-European studies, conducted in DEDIPAC TA1

Secondary data	**Population**	**Topic of the study**
Dietary behaviour		
ProChildren	Boy and girls 11 years	Correlates of irregular family meal patterns
HELENA	Boys and girls 12.5-17.5 years	Breakfast skipping and overweight
Physical activity and sedentary behaviour		
European Youth Heart Study (EYHS), International Children Accelerometer Database (ICAD), HELENA, IDEFICS, additional national and international cohorts (e.g. ISCOLE) including at least 400 participants	Boys and girls <18 years	Objectively measured prevalence of physical activity and sedentary behaviour among 45,000 young people from at least 18 European countries
Health Survey for England Hansen et al. (Norway) Baptista et al. (Portugal) ABC study (Sweden) SNAP study (Sweden)	Adults ≥20 years	Objectively measured prevalence of physical activity and sedentary behaviour among 9500 adults from England, Norway, Portugal and Sweden.

Top level assessment methodology and toolbox

The toolbox was constructed based on the available evidence on tools and their performance to assess diet, physical activity and sedentary behaviour and their determinants. The evidence was extracted from SLRs and secondary data analyses (WP1.1 and WP1.2). Based on this information, the TA1 toolbox provides access to a large number of methods for assessing dietary, physical activity and sedentary behaviours, by study domain and target group and it provides insight into validity and reliability for key methods.

At a general level the evidence for diet, physical activity and sedentary behaviour and their DETERMINANTS showed:

- *Dietary behaviours* are usually assessed by food frequency questionnaires in etiologic research and using food frequency questionnaires, 24 hour recalls or record methods in surveillance. These are self-reported but standardised methods, for which validity has been evaluated at the level of selected nutrients using advanced measurement error models. A generic approach to dietary assessment tools was not considered realistic and TA1/WP1.1 decided to focus on assessment of specific foods (sugar-sweetened beverages and fruits and vegetables), indicator nutrients (fibre, folate, vitamin B12), overall dietary patterns, and meal patterns.
- *Physical activity and sedentary behaviour* are assessed by a number of methods, including self-report, pedometers, heart rate monitors, accelerometers and combined sensors. Self-report has been used frequently in the past, but the majority of methodological studies have found that objective methods (worn devices including accelerometers and combined sensors) are increasingly available, and have much better validity, reliability and sensitivity and are therefore of potential use for improving comparability of surveillance systems across Europe.
- *Determinants* can be assessed at the level of age, sex, socio-economic status, region/country, but pan-European standardisation of methods and instruments seemed rather infeasible. There is a lack of consolidated knowledge regarding a plethora of individual-level determinants, but 10 core lifestyle determinants have been identified for dietary behaviour and 11 key determinants for physical activity and sedentary behaviour.

When comparing the methods in these three domains, it appears that objective methods (biomarkers for diet; accelerometers for physical activity and sedentary behaviour) hold promise for improving comparability between populations and calibrating less well performing (proxy) methods (self-reports). This seems a feasible way forward for physical activity and sedentary behaviour, and is being developed for ambulatory monitoring of dietary behaviours. In this framework, the use of ActivPal in monitoring and surveillance of physical activity and sedentary time has been evaluated in WP1.3.

For determinants, however, the availability of standardized assessment methods is lagging behind and knowledge on individual level psycho-social determinants is mainly based on self-reports with limited international comparability. Finally, the three domains are quite disjointed and methods usually address either diet, physical activity (with or without sedentary behaviour) or determinants; few methods are able to assess these three behaviours and their determinants simultaneously in the same people. Because of this, WP1.1 also contributed to an innovative instrument to combine such

assessment and improve the assessment of behaviours and determinants by ambulatory monitoring (WP1.1).

Population groups and European diversity

For both the SLRs and the toolbox, TA1 aimed to cover the whole age range. However for the integrated method we had to select a public health challenge and chose to study sugar-sweetened beverages in young adolescents and sedentary behaviour in primary and secondary school students, as these are important target groups for behaviour change with the highest impacts on future public health gains. For physical activity and sedentary behaviour the SRLs specifically stratified the available evidence for youth (≤18 years) and adult (>18 years) populations keeping in mind that data on elderly are scarce.

For diet, meal patterns varied across European countries. The European diversity was evident particularly for breakfast consumption, snacking patterns, meals eaten as a family and TV viewing during meals. For example, several studies found that children native to the country of study were more likely to have daily breakfast, compared to non-natives, while children of native parents were also more likely to eat breakfast daily. Substantial differences in snack consumption in pre-school children were found across Europe, with Belgian pre-school children showing the highest and Greek children the lowest. Further, geographic differences in food groups consumed as snacks were observed. In relation to TV viewing during meal times, the practice was more commonly found in southern and eastern Europe compared to northern Europe.

For physical activity and sedentary behaviour, the studies included in the SLRs showed substantial variation in the assessment methods, reported outcome variables and, consequently, the presented physical activity levels and time spent sedentary. Because of this, absolute population levels of physical activity and sedentary time in European youth and adults are currently unknown. There is a need for harmonisation and standardisation of objective and subjective methods to assess these behaviours to enable better comparison across European countries.

Roadmap towards pan-European surveillance

An inventory was made of national and pan-European surveillance systems relevant to diet, physical activity and sedentary behaviour and determinants in Europe (TA1/WP1.3). In addition an e-mail survey among 10 European Strategy Forum on Research Infrastructures-Biological and Medical Science Research Infrastructures (ESFRI-BMS RIs) is being analysed to outline the European RI landscape of potential relevance to DEDIPAC. An expert panel with representatives from WHO-COSI, HBSC, EU Menu, GloboDiet, EHIS and the “Nordic Monitoring of Diet, Physical Activity and Overweight”, the German national surveillance system KiGGS and other stakeholders was established to discuss the steps towards a harmonised pan-European surveillance systems.

Developments

The toolbox is currently being implemented by the DEDIPAC coordinating office, in collaboration with TA1 and the web-developer. The toolbox will provide guidance for underpinning choices and advancing further development and standardisation of assessment methods for research, surveillance and evaluation. This is of direct relevance to underpinning the appropriate methodology

for a pan-European cohort study on determinants of diet, physical activity and sedentary behaviours. An agreement has been made between the toolbox developers and the DMT to ensure proper reference, ownership and future use beyond the formal termination of DEDIPAC. The principle of the agreement is that others can use, adapt and further build upon the toolbox as granted under specific Creative Commons conditions: 'NonCommercial-ShareAlike'. This license lets others adapt, and build upon the toolboxes non-commercially, as long as they credit DEDIPAC and license their new creations under identical terms. The toolbox will be made publicly available to support policy-makers and researchers outside DEDIPAC.

Thematic Area 2

General objectives

The overall objective of TA2 "Determinants" was to provide the pan-European research community with trans-disciplinary frameworks of determinants of dietary, physical activity, sedentary behaviours and social inequalities, including best-practice methods to analyse data that are based on such frameworks, and the identification of gaps in current research.

The general objectives were to:

1) Establish trans-disciplinary European research networks on determinants of dietary, physical activity, sedentary behaviours and social inequalities;

2) Develop dynamic and evolving European frameworks for the determinants of dietary, physical activity and sedentary behaviours, and make an inventory of data collection procedures and measures of determinants (to be further evaluated by TA1), while identifying gaps in current research and methods;

3) Conduct trans-disciplinary, advanced statistical analyses and case studies that contribute to new knowledge to further develop the frameworks about determinants of dietary, physical activity, sedentary behaviours and social inequalities.

Achievements

The above listed overall and general objectives have been achieved through the organisation of TA2 in 4 WPs with the same aims and tasks across the WPs. The WPs had the following focuses: WP2.1: diet; WP2.2: physical activity; WP2.3: sedentary behaviour; and WP2.4: social inequalities/ethnic minorities. As far as possible, the WPs covered all age groups across the life course with a primary focus on the general population, but a special focus on social inequalities/ethnic minorities - as high risk populations - in WP2.4.

The three TA2-leaders and a representative of the coordinating team had monthly teleconferences ahead of the DMT-meetings. Each TA2-leader was assigned to a WP within TA2 and has participated in their teleconferences and task-related work. There have been three live meetings and a statistical workshop for TA2. At the DEDIPAC kick-off meeting in Amsterdam in May 2014, there was a TA2 session for all scientists involved in TA2. In January and December 2015 the TA2-leaders and WP-leaders met in Amsterdam to report on progress and discuss the work ahead.

The WPs in TA2 adopted slightly different approaches to the implementation of their work. The scope of research on the determinants of dietary behaviour and physical activity is significant and these WPs adopted a pragmatic approach by focusing on key areas. On the other hand there has been very little work to date on the determinants of sedentary behaviour (WP2.3) or socio-economic inequalities and ethnic minorities (WP2.4). These WPs took a bigger picture approach to build a base of evidence and provide a foundation for future work. At the same time there was overlap between the activity in WP2.2 and WP2.3 and this was managed by the WP-leaders. Finally, while socio-economic inequalities were deemed important enough to be a stand-alone WP, the broader role of socio-economic determinants also cuts across the other WPs in TA2.

Objective 1) Establish trans-disciplinary European research networks on determinants of dietary, physical activity, sedentary behaviours and social inequalities.

Table 3 shows that the WPs/networks have been highly successful with regards to attracting a large number of scientists across DEDIPAC affiliated institutes, countries and disciplines. The network on diet (WP2.1) is clearly the largest within TA2, hence it has been structured into 4 groups (covering the 4 age groups targeted by the research) with 4 additional subgroup-leaders. These subgroup-leaders represented their group of researchers in the teleconferences and the WP-leaders had e-mail communication with the scientists through the subgroup-leaders. Despite the organizational complexities due to the much larger number of researchers, for task 2 (statistical analysis) within WP2.1 there have been four live meetings to discuss the secondary data analysis. The physical activity network (WP2.2) is the second largest, but here the organization of the work was strongly coordinated by the WP-leaders who communicated directly to the scientists via e-mail and at the several telephone and live meetings. The network on sedentary behaviour (WP2.3) had a reasonable size allowing all partners to be involved in the monthly teleconferences and they also had the most live meetings. The network on Social inequalities (WP2.4) is the smallest and thus they easily had all partners involved in the teleconferences, but the size has also put some pressure to complete similar tasks as the other WPs with less manpower. However, this has been solved through good collaboration with the other WPs.

Table 3. Overview of the transdisciplinary networks in TA2 and the number of publications.

Focus	**Number of scientists and partners**	**Number of countries**	**Number of areas of expertise**	**Number of publications**
WP2.1 Diet	100 scientists 23 partners 40 organizations	13	21	2 published 6 submitted 13 being drafted
WP2.2 Physical activity	74 scientists 12 partners 25 organizations	8	19	1 published 4 submitted 7 being drafted
WP2.3 Sedentary behaviour	18 scientists 8 partners 9 organizations	6	16	5 published 3 submitted 3 being drafted
WP2.4 Social inequalities	13 scientists 7 partners 7 organizations	6	5	2 published 1 submitted 5 being drafted

All networks set up management and communication procedures, and completed their tasks. Some gaps were identified such as the limited number of countries especially from eastern and southern Europe involved in DEDIPAC, few members focused specifically on the age group of adolescents in WP2.1, and relatively few members with expertise on/experience with more upstream (i.e. environmental and policy) determinants was less available than regarding the 'closer' (individual and interpersonal) determinants. All networks aim to continue to exist as outlined in their network reports (Deliverables 2.1.2/2.2.2/2.3.2./2.4.2), but are dependent on some funding to continue basic activities (i.e. updating frameworks and annual meetings) and also that there are research calls that enable future collaboration on determinant research.

2) Develop dynamic and evolving European frameworks for the determinants of dietary, physical activity and sedentary behaviours, and make an inventory of data collection procedures and measures of determinants (to be further evaluated by TA1), while identifying gaps in current research and methods.

The frameworks were developed in order to foster multidisciplinary systems thinking and thereby move beyond silos of each discipline and the current focus on ecological models. The general method/approach taken to develop the frameworks was thus to define the behavioural outcomes; collect all potential determinants through both evidence (existing and new reviews) and eminence (expert opinions); structure the potential determinants into groups/systems; rate the potential determinants with regard to research priority, modifiability and potential effect; and finally visualizing as systems. In this final phase, WP2.1 chose to provide an interactive website with an overview of all determinants (https://www.uni-konstanz.de/DONE/) rather than a systems framework. WP2.4 developed their own frameworks for determinants of dietary behaviours and physical activity/sedentary behaviour of ethnic minorities, but also addressed issues of similarities and differences with the main frameworks by feeding their potential determinants into these frameworks.

There are 21 reviews of determinants being written in TA2, of which 5 are currently published[4] and 6 have been submitted for publication. These reviews made important contributions to the development of the frameworks by inputting to the lists of potential determinants. Because of the large number of reviews on the determinants of physical activity already available, WP2.2 summarised and interpreted these SLRs in seven umbrella SLRs ('reviews of reviews'). A preliminary comparison between the factors included in the EUropean Physical Activity Determinant (EU-PAD) framework and the probable or convincing evidence for determinants of physical activity summarized in the seven umbrella SLRs indicates only a limited correspondence (34%). These findings substantiate the need for future multi- and trans-disciplinary research on determinants of physical activity. Furthermore, a systematic interdisciplinary mapping (SIM) review on consumer food decision making and its determinants was conducted using rapid review techniques to explore the state-of-the-art, and to identify hot topics and research gaps in this field. This interdisciplinary review includes 1,820 publications in 485 different journals and other types of publications from more than

[4] Chastin SFM, et al. Systematic literature review of determinants of sedentary behaviour in older adults: a DEDIPAC study. International Journal of Behavioral Nutrition and Physical Activity. 2015;12:127. doi: 10.1186/s12966-015-0292-3.

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Stelmach-Mardas M, et al. Seasonality of food groups and total energy intake: a systematic review and meta-analysis. Eur J Clin Nutr. 2016;70(6):700-8. doi: 10.1038/ejcn.2015.224.

Osei-Kwasi HA, et al. Systematic mapping review of the factors influencing dietary behaviour in ethnic minority groups living in Europe: a DEDIPAC study. Int J Behav Nutr Phys Act. 2016;13:85. doi: 10.1186/s12966-016-0412-8.

ten disciplines (including nutritional science, medicine/health science, psychology, food science and technology, business research, etc.) across a period of 60 years. After applying qualitative and quantitative analyses, this study revealed that most of the research emphasizes biological, psychological, and product-related predictors, whereas policy-related influences on food choice are scarcely considered. In this way, the systematic interdisciplinary mapping study indicates new determinants for future empirical research and it shows how known determinants should be embedded in new or different contexts in future studies (e.g. to embed policy determinants in studies with a focus on individual decision making).

A list of measures of core determinants was compiled by each WP. Ideally these lists should have evolved from the frameworks, but the first drafts of these lists had to be made earlier (month 12) to accommodate the timelines in TA1 and TA3. A joint report on these core measures with a chapter from each WP was written as an internal DEDIPAC report. The report was primarily for TA1, which has selected core determinants and has reported on their measurement properties. As reviewing all measures for each of these determinants was a task beyond the scope of DEDIPAC, an exemplar review in WP2.1 was conducted to examine the measures of determinants of availability/accessibility of foods/drinks for children (< 18 years). This review has been submitted for publication.

The analyses of the existing knowledge identified several gaps. First, there is a lack of consistent definitions for the outcomes (i.e. dietary behaviour, physical activity), with many different types and terms used. Secondly, a wide range of study designs, measurement techniques, population groups, determinants investigated, and outcomes emerged from the primary studies, making it difficult to evaluate and compare the evidence and to draw definitive conclusions. In particular, the most commonly used study design was cross-sectional, hence limiting the strength of the evidence because of the lack of information about the *changes* in determinants over time, and the corresponding *changes* in behaviour. Furthermore, information about interrelations between determinants, especially determinants at the different socio-ecological levels within systems are severely lacking. Finally, WP2.4 concluded that within 'mainstream' research on the determinants of health behaviour in Europe, ethnic minorities are often either not included or their numbers are too small to enable meaningful analysis of the determinants of health behaviour in specific ethnic minority groups, including diet, physical activity and sedentary behaviour. Much of the body of research that does focus on ethnic minorities has tended to lay emphasis on describing health and health behaviour differences between ethnic groups and majority/host populations with few attempts to study the drivers of these behaviours. Also, few studies of ethnic minorities focused on children or the older adults, and sedentary behaviour was not assessed. The challenge in drawing conclusions from the literature highlights the pressing need for the harmonisation of definitional and data collection procedures in future research, and to continue to consider the best ways to include the ethnic minority/social inequality perspective in this research.

3) Conduct trans-disciplinary, advanced statistical analyses and case studies that contribute to new knowledge to further develop the frameworks about determinants of dietary, physical activity, sedentary behaviours and social inequalities.

A data pooling taskforce across WP1.1, 1.2, 2.1, 2.2, 2.3 & 2.4 was formed and a five-step methodology was followed, covering the 1) identification of relevant datasets across Europe, 2) development of a dataset compendium including details on the design, study population, measures, and level of accessibility of data from each study, 3) definition of key topics and approaches for secondary analyses, 4) process of gaining access to datasets, and 5) pooling and harmonisation of the data and the development of a data harmonisation platform. A total of 114 unique datasets were included in the DEDIPAC compendium (and another 33 are being screened). The compendium contained more detail than the initial inventory as done at the DEDIPAC proposal stage, and was used by WP2.2 and WP2.3 to arrive at a consensus regarding the appropriate datasets to harmonise and analyse. WP2.1 also contributed to the compendium but, in addition, undertook the analysis of proposed research questions via meta-analysis. This type of joint analysis was based on a common data analytical syntax applied at the locally stored data. Meta-analysis does not require the exchange of raw data but is combining aggregated table information to a single research outcome. This type of meta-analytical approach is now been investigated in a formal federated database analysis (opal with data shield algorithms) within the ENPADASI project. In this way, the DEDIPAC-project was very helpful to pave the way for multi-centric analyses based on a high level IT-infrastructure. WP2.4 assessed the potential of using data from the compendium to do analysis in different ethnic groups on physical activity/sedentary behaviour but this was not possible due to limited numbers, diverse ethnic groups covered and lack of harmonised methodology. Furthermore, quite often the numbers of ethnic minorities included in some of the pan-European studies were too small to enable detailed analysis of specific groups, thus they are often 'lumped' together to increase statistical power. This does not do justice to the differences between different ethnic groups on the basis of culture, migration history (e.g. voluntary vs forced migration, migration as an adult vs migration during childhood etc.). As a result, in WP2.4, specific case studies and secondary data analysis were conducted, rather than pooled analyses or federated meta-analysis.
A workshop on statistical analyses for secondary data analysis was organised across the WPs in TA2 in July 2015 in Amsterdam. The keynotes examined the utility of the following for harmonisation/secondary data analysis: Bayesian analysis, meta-analysis, mediation/moderation analysis, longitudinal and multilevel analysis. Various approaches to harmonisation and tailored software platforms were also considered and the WPs worked on their research questions. The secondary data analyses are ongoing with more than 30 planned manuscripts, of which 1 is published[5] and 4 have been submitted. The results will subsequently be related to the frameworks and used for prioritizing future research.

Of the 114 datasets in the compendium, 14 were eventually obtained and reused to address 10 exemplar research questions on determinants of physical activity and sedentary behaviour. So far, these manuscripts include a variety of methods of analysing the data; such as Bayesian Network analysis of the determinants of Physical Activity and Sedentary Behaviour in the Eurobarometer dataset; structural equation modelling and meta-regression to examine more complex interactions with selected moderator/mediator variables of physical activity behaviour within harmonised

[5] Si Hassen W, et al. Socioeconomic Indicators Are Independently Associated with Nutrient Intake in French Adults: A DEDIPAC Study. Nutrients. 2016; 8(3):158. doi:10.3390/nu8030158.

datasets. The DEDIPAC data harmonisation platform proved to be useful for pooling, but in general, harmonisation was often restricted to just a few core (crude) outcome variables and some individual-level socio-demographic correlates of these behaviours. Many barriers exists such as time required to gain access to data, variation in the harmonisation potential of variables, a lack of datasets specifically emphasising determinants of behaviour; few longitudinal studies examining determinants and nation and age-span coverage etc. The stepwise process has been described in a 'methods' paper, which has been submitted for publication. In addition, a draft is currently being completed of a position paper which draws on the possibilities and impossibilities of secondary data analyses of pooled and harmonised data on determinants of physical activity and sedentary behaviour.

The main gaps identified were lack of datasets specifically emphasising determinants of behaviour - especially at the more macro level and with a systems approach; few longitudinal studies examining determinants and nation and age-span coverage. Most studies investigate the behaviour-disease relationships. Furthermore, there was a clear lack of indicators of ethnic minority status in the studies currently collected for the compendium.

Developments

The four networks established in TA2 would like to continue to build upon the research agenda and network of the extensive DEDIPAC consortium and thus provide a sustainable infrastructure for the generation of new knowledge regarding the behaviours and their multi-disciplinary and multi-level determinants, as well as addressing social inequalities (especially with regards to ethnic minorities). Furthermore, the results of TA2 and the continued work of the networks will be key elements in evaluating the effectiveness of policies and interventions, and to improve their design in the future.

The networks will aim to:

1) Develop the frameworks further by addressing the gaps in new studies.
2) Exploit the past by applying advanced harmonisation processes to existing datasets.
3) Look to the future by harmonising methodologies and research agendas on a European basis.

The most important recommendation for future development, that gained universal consensus, was the development of a cohort study of the determinants of behaviours. To gain greater insights into what are the core determinants of risk behaviour (diet, physical activity and sedentary behaviour) and to achieve this understanding within a shorter timeframe a cohort study is an essential goal. Cohort studies, along with randomised controlled trials, are considered the most effective methodology to establish cause-effect relationships in behavioural research. No such cohort exists dedicated to understanding and identifying the individual and contextual determinants of risk behaviour, or the 'causes of the causes' of major non-communicable diseases.

Continue to exploit existing data - A safe conclusion is the retrospective data harmonisation and secondary data analysis has some potential to add to existing knowledge when examining risk behaviours, indicators and the determinants of dietary, physical activity and sedentary behaviour. This conclusion is evident across a number of WPs within DEDIPAC, significant progress has been made in the harmonisation of both behaviour and determinant data. Potential also exists in the secondary data analysis of single datasets. This work should continue and the potential benefits of

utilising existing data should be fully exploited. The existing Compendium of relevant datasets of behaviour and their determinants should be further expanded and updated.

However, prospective harmonisation of data collection is essential if our understanding of the drivers of behaviour is to increase and if a greater number of core determinants are to be identified. This should be progressed by 1) Moving towards further harmonisation of future research –in terms of methods and measures- studies across and within nations; 2) Progressing a large scale cohort study with a specific focus on contextual and individual determinants of behaviour across the different regions of Europe and 3) Sustain the DEDIPAC networks so that 1 and 2 are possible.

Thematic Area 3

The overall aim of TA3 was to contribute to the development of a pan-European toolbox for the development, evaluation and implementation of public policies and multicomponent interventions related to physical activity, sedentary behaviour and dietary behaviour. The general objectives of TA3 are to (1) improve the quality of public policies and multicomponent interventions promoting healthful diets, physical activity and reducing sedentary behaviour by developing a database with good practices, (2) improve their implementation (from research to practice/policy) and transferability (from practice/policy to practice/policy), (3) develop a preliminary toolbox for further developing, monitoring and evaluation policies across Europe, and (4) to pilot test this draft toolbox in different European countries using natural experiments. Throughout three DEDIPAC-years, all partners within TA3 worked on diverse tasks within the field of public policies and multicomponent interventions.

Organisation and communication

The above listed overall and general objectives have been achieved through dividing the work in 3 WPs. The WPs had the following focuses: WP3.1: good practices and implementation conditions; WP3.2: toolbox for public policies; and WP3.3: toolbox for multicomponent interventions.

The first year, the TA3-leaders and WP-leaders had monthly teleconferences, which was also the case for all WP-specific partners. Those monthly teleconferences were held with GoToMeeting and were needed to finalise the first draft of the TA3 toolbox that had to be ready by the end of the first DEDIPAC-year. There have been seven live meetings for TA3. At the DEDIPAC kick-off meeting in Amsterdam in May 2014, there was also a TA3 session for all partners involved in TA3. All other meetings were held with the common goal to deliver the DEDIPAC TA3 toolbox for the development, implementation and evaluation of public policies and multicomponent interventions. WP3.1 also had one specific WP3.1 meeting, which was held with the goal to discuss the case studies that were specifically conducted within WP3.1.

Work Package 3.1

The aim of WP3.1 was to (1) improve the quality of public policies and multicomponent interventions targeting healthy dietary behaviours, sufficient physical activity and a limitation of sedentary behaviour by developing a database with good practices, and (2) improve the implementation of these public policies and multicomponent interventions.

More specifically, WP3.1 conducted a rapid review on the definition and characteristics of good practice public policies and multicomponent interventions. During the kick-off meeting in Amsterdam (May 2014), this definition was discussed among researchers and this resulted in a consensus about how to define good practice policies or multicomponent interventions. The rapid review was published in BMC Public Health.[6]

[6] Horodyska K, et al. Good practice characteristics of diet and physical activity interventions and policies: an umbrella review. BMC Public Health. 2015;15:19. doi: 10.1186/s12889-015-1354-9.

Furthermore, an inventory of good practice public policies and multicomponent interventions and their characteristics was developed and was based on the input from ten DEDIPAC countries. Based on the inventory of good practices, a database of good practice public policies and multicomponent interventions was developed. This web-based database was developed to increase the use and knowledge of good practices in designing and implementing public policies and multicomponent interventions.

In addition, a SLR of the critical implementation and transferability conditions and development of methodology was published in BMC Public Health.[7] The SLR included information on necessary conditions for successful implementation.

Finally, case studies that investigated implementation and transferability issues were conducted within five DEDIPAC countries (Belgium, Germany, Ireland, Norway and Poland). These case studies focused on what health promotion professionals and policy makers believed is important for implementation and transferability. A manuscript has been drafted and is submitted to a peer reviewed journal.

Work package 3.2 and 3.3

The aim of WP3.2 and WP3.3 was to (1) develop a concept toolbox for the development, monitoring and evaluation of public policies and multicomponent interventions across Europe, (2) test this concept toolbox in different European countries using natural experiments, and (3) integrate the findings with the other WPs to build the DEDIPAC Knowledge Hub pan-European toolbox for Development, Evaluation and Implementation.

More specifically, both WP3.2 and WP3.3 undertook a rapid review on monitoring and evaluation of public policies (WP3.2) and multicomponent interventions (WP3.3). Furthermore, specific subtasks within the development of the concept toolbox were divided among partners. This means that some partners were responsible for developing a template for the description of public policies and multicomponent interventions, which included the content and the implementation conditions. Other partners were responsible for the development of an inventory of standardized measures to evaluate changes in determinants, behaviours, and physical and mental health indicators. All relevant information regarding the validity, reliability was taken into account and added, as well as the objective/subjective way of assessment. This means that researchers, practitioners and policy-makers are able to look for the best methods to evaluate their interventions or policies. Another subtask was the development of a model and measurements for the economic evaluation of public policies and multicomponent interventions. Finally, also process evaluation measures and measures to evaluate the reach, effectiveness, adoption, implementation and maintenance were developed

[7] Horodyska K, et al. Implementation conditions for diet and physical activity interventions and policies: an umbrella review. BMC Public Health. 2015;15:1250. doi: 10.1186/s12889-015-2585-5.

and collected. All the information and content from the subtasks were eventually combined into a concept toolbox for developing, evaluating and implementing public policies and multicomponent interventions. Throughout the development of the toolbox, high-risk groups were also taken into account. For example, separate tables were made within the evaluation part (outcome) that incorporate high risk populations.

A second task within WP3.2 and WP3.3 was to pilot test the concept toolbox in different European countries by using natural experiments of policies (WP3.2) and multicomponent interventions (WP3.3). The result was two-fold. On the one hand, we gathered extra information on the effectiveness of these (good practice) policies and interventions that was also added to the concept toolbox, and we collected information on the usefulness, feasibility and applicability of the toolbox. This information gave us a direction for the further development of the DEDIPAC toolbox.

In a final task, a consensus meeting was organized. The goal of this consensus meeting was to integrate the findings of the natural experiments on the public policies and multicomponent interventions. TA3 partners were invited to reach consensus about the concept toolbox and its content, visual appearance, user-friendliness, etcetera. During the consensus meeting, partners came up with a list of possible improvements to the toolbox, which were then implemented and finalized in the online toolbox.

2. Overview Milestones

No.	Milestone name	WPs involved	Month	Nature	Achieved
0.1.1	Kick-off consortium meeting	All	1	Meeting	Yes
1.1.1	Initiating and defining SLR on methods, including validity/reliability	1.1	1	Planning workshop	Yes
1.2.1	Task leader meeting to align tasks	1.2	2	Meeting	Yes
2.1.1	List of members of the trans-disciplinary network of determinants of dietary behaviour	2.1	3	Member list	Yes
2.2.1	List of members of the trans-disciplinary network of determinants of physical activity	2.2	3	Member list	Yes
2.3.1	List of members of the trans-disciplinary network of determinants of sedentary behaviour	2.3	3	Member list	Yes
2.4.1	List of members in the trans-disciplinary network on social inequalities in dietary, physical activity and sedentary behaviours	2.4	3	Member list	Yes
0.1.3	Opening of the web portal with functionalities for document exchange, consortium and WP-specific e-mail lists, web based data exchange	All	4	Web portal	Yes
1.1.2	Expert workshop on public health challenges	1.1 & 1.2, selected TA2 & 3 experts	5	Expert workshop	Yes
0.1.2	Management team meetings	All	6	Meeting	Yes
0.1.4	Communication/ Dissemination plan	All	6	Plan	Yes
1.2.2	Identification literature and databases	1.2	6	List of studies & databases	Yes
1.1.5	Provisional priority list of methods from TA1 & TA2	1.1, 1.2, 2.1-2.4	6, 12	Inventory list	Yes
1.3.1	Identification of stakeholders and networks potentially of interest for pan-European surveillance	1.3	6	Longlist	Yes
1.1.3	Completion SLR	1.1	10	SLR completed	Yes
2.1.2	List of core measures and methods used to assess determinants of dietary behaviour and identified gaps	2.1, 1.1, 3.1-3.3	12	Measures list	Yes
2.1.3	First draft of the framework of determinants of dietary behaviour	2.1, 1.1	12	Draft framework	Yes
2.1.4	List of datasets and studies with determinants of dietary behaviour	2.1, 1.1	12	Dataset list	Yes
2.2.2	List of core measures and methods used to assess determinants of physical activity and identified gaps	2.2, 2.3, 1.2, 3.1-3.3	12	Measures list	Yes
2.2.3	First draft of the framework of determinants of physical activity	2.2, 2.3, 1.2	12	Draft framework	Yes
2.2.4	List of datasets and studies with determinants of physical activity	2.2, 2.3, 1.2	12	Dataset list	Yes

2.3.2	List of core measures and methods used to assess determinants of sedentary behaviour and identified gaps	2.3, 2.2, 1.2, 3.1-3.3	12	Measures list	Yes
2.3.3	First draft of the taxonomy of sedentary behaviour and the framework of determinants of sedentary behaviour	2.3, 2.2, 1.2	12	Draft framework	Yes
2.3.4	List of datasets with determinants of sedentary behaviour	2.3, 2.2, 1.2	12	Dataset list	Yes
2.4.2	List of measures and methods used to assess social inequalities in dietary, physical activity and sedentary behaviours and identified gaps	2.4, 2.1-2.3, 1.1, 1.2	12	Measures list	Yes
2.4.3	First draft of a conceptual model on social inequalities in dietary, physical activity and sedentary behaviours	2.4, 2.1-2.3, 3.1-3.3	12	Draft model	Yes
2.4.4	List of datasets on determinants of social inequalities in dietary, physical activity and sedentary behaviours	2.4, 2.1-2.3	12	Dataset list	Yes
2.4.5	List of social groups that are not covered in existing datasets	2.4	12	Social groups list	Yes
3.2.1	Draft conceptual toolbox for developing, monitoring and evaluating policies	3.2, 1.1, 1.2, 2.1, 2.2, 2.3	12	Draft toolbox	Yes
3.3.1	Draft conceptual toolbox for developing, monitoring and evaluating multi-component interventions integrated with policies	3.3, 1.1, 1.2, 2.1, 2.2, 2.3	12	Draft toolbox	Yes
1.1.4	Identification and description of European datasets	1.1, 1.2, 1.3		Inventory list	Yes
1.1.6	Workshop secondary data analysis	0.1, 1.1	14	Workshop	Yes
1.1.7	Validity/reliability data integrated	1.1 & 2.1	18	Process completed	Yes
1.2.10	Determinants of physical activity and sedentary behaviours	1.2	18	Shortlist	Yes
1.3.2	Launch of feasibility study for surveillance (month 18) and for research (month 20)	1.1, 1.3	18, 20	Start data collection	Yes
2.1.5	Trans-disciplinary workshop to discuss the second draft of the framework of determinants of dietary behaviour outside DEDIPAC	2.1, 1,1	18	Workshop	Yes
2.2.5	Trans-disciplinary workshop to discuss the second draft of the framework of determinants of physical activity outside DEDIPAC	2.2, 2.3, 1.2	18	Workshop	Yes
2.3.5	Trans-disciplinary workshop to discuss the second draft of the framework of determinants of sedentary behaviour outside DEDIPAC	2.3, 2.2, 1.2	18	Workshop	Yes
2.4.6	Trans-disciplinary workshop to discuss a draft of the framework of social inequalities in dietary, physical activity and sedentary behaviours outside DEDIPAC	2.4, 3.3	18	Workshop	Yes
2.1.6	Statistical workshop and writing retreat to work on high level /innovative scientific articles on determinants of dietary behaviour	2.1	20	Workshop	Yes
2.2.6	A statistical workshop and writing retreat to work on high level /innovative scientific	2.2, 2.3	20	Workshop	Yes

	articles on determinants of physical activity				
2.4.7	Statistical workshop and writing retreat to work on high level /innovative scientific articles on social inequalities in dietary, physical activity and sedentary behaviours	2.4, 2.1-2.3	20	Workshop	Yes
1.2.3	Draft on sources of variation in physical activity and sedentary behaviour in adults	1.2	21	Draft text	Yes
1.2.4	Draft on sources of variation in physical activity and sedentary behaviour in children	1.2	21	Draft text	Yes
1.2.5	Data harmonisation & pooling self-report data on physical activity and sedentary behaviour	1.2	21	Dataset	Yes
1.2.6	Data harmonisation & pooling objective data on physical activity and sedentary behaviour	1.2	24	Dataset	Yes
1.3.3	Provision of analysis datasets from feasibility studies (surveillance)	1.3	24	Dataset	Yes
3.1.1	Information from all 11 DEDIPAC member states to feed in into the database	3.1	24	Information	Yes
1.2.7	"State of the art" methods physical activity	1.2, 2.2	26	Draft report	Yes
1.2.8	"State of the art" methods sedentary behaviour	1.2, 2.3	26	Draft text	Yes
1.2.9	Selection of methods for incorporation in toolbox	1.1, 1.2	26	List	Yes
1.3.4	Provision of analysis datasets from feasibility studies (research)	1.3	26	Dataset	Yes
1.2.11	Methods for key determinants physical activity and sedentary behaviour received from TA2	1.2, 2.2, 2.3	30	Draft text	Yes
2.3.6	Writing retreat to work on high level/innovative scientific articles on determinants of sedentary behaviour	2.3, 2.2	30	Workshop	Yes
3.1.2	Database of good practices	3.1	30	Database	Yes
3.2.2	Preliminary tested DEDIPAC Knowledge Hub pan-European toolbox for Development, Evaluation and Implementation	3.2, 3.1, 3.3	30	Toolbox	Yes
3.3.2	Preliminary tested DEDIPAC Knowledge Hub pan-European toolbox for Development, Evaluation and Implementation	3.3, 3.1, 3.2	30	Toolbox	Yes
0.1.8	DEDIPAC toolbox online	all	32	Toolbox	Yes
1.2.12	Data harmonisation & toolbox	1.1, 1.2	32	Workshop	Yes
0.1.10	Final symposium	all	35	Meeting	Yes
0.1.7	Summary report on a DEDIPAC specific symposium held on at least one international scientific conference	all	36	Report	Yes
0.1.9	A report listing early career DEDIPAC fellowship students and their activities done at DEDIPAC partner sites	all	36	Report	Yes
0.1.5	Consortium agreement into force	All	ASAP	Agreement	Yes
0.1.6	"In progress " symposium on research in DEDIPAC held at an international scientific conference	All	TBD	Symposium	Yes

3. Overview Deliverables

No.	Deliverable name	WP	Month	Nature	Dissemination level	Achieved
0.1.1	DEDIPAC Knowledge Hub website	0.1	4	Website	Public	Yes
1.3.1	Interim report on identified methods for a pan-European surveillance framework: mapping of instruments and methods	1.3	6	Interim report	Public	Yes
3.1.1	Report of consensus on how to define good practices for policies or multi-component interventions	3.1	6	Report	Public	Yes
3.2.1	Report on policy monitoring and evaluation based on literature search and rapid review	3.2	6	Report	Public	Yes
3.3.1	Report on multi-component intervention monitoring and evaluation based on literature search and rapid review	3.3	6	Report	Public*	Yes
0.1.3	Manuscript on rationale, structure, aims and working procedures of DEDIPAC Knowledge Hub submitted for publication	0.1	8	Manuscript	Confidential*	Yes
1.3.2	Toolbox for feasibility testing: shortlist of instruments selected and their corresponding standard operating procedures and training material for feasibility testing	1.3	12	Report	Public*	Yes
1.3.6	Specification of gaps and needs for a harmonised pan-European surveillance	1.3	12	Report	Public*	Yes
3.2.2	Report of conceptual toolbox for policies	3.2	12	Report	Public	Yes
3.3.2	Report of conceptual toolbox with regard to multi-component interventions	3.3	12	Report	Public	Yes
0.1.4	Periodic report	0.1	18	Report	Public	Yes
1.3.7	Report on first expert workshop of TA1	1.3	18	Report	Public	Yes
2.1.1	Report of core measures and methods used to assess determinants of dietary behaviour across the life course	2.1	18	Report	Public**	Yes
2.2.1	Report of core measures and methods used to assess determinants of physical activity behaviour across the life course	2.2	18	Report	Public**	Yes
2.3.1	Report of core measures and methods used to assess determinants of sedentary behaviour across the life course	2.3	18	Report	Public**	Yes
2.4.1	Report of measures and methods used to measure social indicators to allow for an assessment of social inequalities in dietary, physical activity and sedentary behaviours across the life course	2.4	18	Report	Public**	Yes
1.1.2	Manuscript on variation in dietary behaviour	1.1	24	Manuscript	Confidential*	Yes

1.1.3	Innovative integrated method for diet, physical activity and sedentary behaviours	1.1	24	Integrated method	Confidential*	Yes
1.2.1	Report on variation in physical activity and sedentary behaviours, adults	1.2	24	Report	Public*	Yes
1.2.2	Report on variation in physical activity and sedentary behaviours, children	1.2	24	Report	Public*	Yes
1.3.8	Report on synergies and interfaces between DEDIPAC, future pan-European surveillance and research infrastructures	1.3	24	Report	Public	Yes
3.1.2	Report of case studies in 4 DEDIPAC member states investigating conditions for successful implementation and transferability	3.1	24	Report	Public	Yes
1.3.5	Report on critical evaluation of feasibility testing of (novel) instruments for harmonised pan-European surveillance programs	1.3	28	Report	Public	Yes
1.3.4	Report on critical evaluation of feasibility testing of (novel) instruments for pan-European research projects	1.3	32	Report	Public*	Yes
1.3.9	Report on second expert workshop of TA1	1.3	32	Report	Public*	Yes
0.1.2	Web-based open access toolbox	0.1	36	Toolbox	Public	Yes
0.1.5	Manuscript summarising and integrating the results from TA1-3	0.1	36	Manuscript	Public	Extended deadline
0.1.6	A print and electronic brochure summarizing the main results, conclusions and recommendations to be disseminated to policy and practice stakeholders	0.1	36	Brochure	Public	Yes
0.1.7	Final report	0.1	36	Report	Public	Yes
1.1.1	Toolbox of assessment methods (structure, content for diet)	1.1	36	Website	Public	Yes
1.2.3	Report on datasets and self- report data among adults	1.2	36	Report	Public	Yes
1.2.4	Report on data on objective methods in children	1.2	36	Report	Public*	Yes
1.2.5	Report on methods for physical activity and sedentary behaviour	1.2	36	Report	Public*	Yes
1.2.6	Toolbox structure and content (physical activity and sedentary behaviour)	1.2	36	Report	Public	Yes
1.2.7	Report on reliability and validity of methods	1.2	36	Report	Public*	Yes
1.3.3	Final report on amended toolbox	1.3	36	Report	Public	Yes
1.3.10	Roadmap towards a harmonised pan-European surveillance system of dietary, physical activity and sedentary behaviours and their key determinants	1.3	36	Report	Public*	Yes
2.1.2	Report outlining the organization of a European trans-disciplinary research network on determinants of dietary behaviours	2.1	36	Report	Public	Yes
2.1.3	Expert position statement on determinants of dietary behaviour	2.1	36	Position statement	Public*	Yes

2.1.4	Two manuscripts on determinants of dietary behaviour submitted for publication	2.1	36	Manuscripts	Confidential*	Yes
2.2.2	Report outlining the organization of a European trans-disciplinary research network on determinants of physical activity behaviours	2.2	36	Report	Public	Yes
2.2.3	Expert position statement on determinants of physical activity	2.2	36	Position statement	Public	Yes
2.2.4	Two manuscripts on determinants of physical activity submitted for publication	2.2	36	Manuscripts	Confidential*	Yes
2.3.2	Report outlining the organization of a European trans-disciplinary research network on determinants of sedentary behaviours	2.3	36	Report	Public	Yes
2.3.3	Expert position statement on determinants of sedentary behaviours	2.3	36	Position statement	Public*	Yes
2.3.4	Two manuscripts on determinants of sedentary behaviour submitted for publication	2.3	36	Manuscripts	Confidential*	Yes
2.4.2	Report outlining the organization of a European trans-disciplinary research network on social inequalities in dietary, physical activity and sedentary behaviours	2.4	36	Report	Public	Yes
2.4.3	Expert position statement on social inequalities in dietary, physical activity and sedentary behaviours	2.4	36	Position statement	Public*	Yes
2.4.4	Two manuscripts on social inequalities in dietary, physical activity and sedentary behaviours submitted for publication	2.4	36	Manuscripts	Confidential*	Yes
3.1.3	Report on the database of good practice policies and multi-component interventions in 11 DEDIPAC member states	3.1	36	Report	Public	Yes
3.1.4	Report with recommendation for improving pan-European toolbox for Development, Evaluation and Implementation	3.1	36	Report	Public*	Yes
3.2.3	Report on integrated findings of natural experiments with policies	3.2	36	Report	Public*	Yes
3.2.4	Report with recommendation for improving pan-European toolbox for Development, Evaluation and Implementation	3.2	36	Report	Public*	Yes
3.3.3	Report on integrated findings of natural experiments with multi-component interventions	3.3	36	Report	Public*	Yes
3.3.4	Report with recommendation for improving pan-European toolbox for Development, Evaluation and Implementation based on multi-component interventions	3.3	36	Report	Public*	Yes

* These reports will become publicly available when the corresponding manuscript is published.

** Since these reports were prepared as internal documents, they will be considered that way.

4. Coordination and achievements

DEDIPAC Knowledge Hub

Achievements

December 6th 2013: Kick-off meeting in Amsterdam

During this meeting, the coordinating team, TA-leaders, and WP-leaders came together to formally start the DEDIPAC Knowledge Hub. The next steps to initiate the proposed work were discussed and planned, the first full consortium meeting was planned, the draft consortium agreement was discussed, as well as opportunities for future acquisition.

February 27-28 2014: DEDIPAC workshop on SLRs

On February 27-28, a workshop on SLRs was organised at the German Institute of Human Nutrition, in Potsdam, Germany. The goals of the meeting were to provide a theoretical and practical introduction to SLRs, as well as to discuss and prepare the different SLR projects within DEDIPAC.

May 2014: DEDIPAC website online

The website (www.dedipac.eu) consists of two parts: 1) a public website with information about the project, and 2) a password-protected 'Partner Portal' which serves as a document and information exchange platform within and between the different tasks, WPs and TAs and the DMT.

May 15th and 16th 2014: Full-consortium meeting in Amsterdam

During this two-day meeting almost 200 researchers from the DEDIPAC Knowledge Hub came together. The program consisted of plenary presentations, separate meetings for each TA and meetings and workshops of the individual WPs and tasks. In addition, there was a live meeting between the DMT and the Steering Committee and the Scientific Advisory Board of DEDIPAC. Informal activities were held for networking.

June 2014: First newsletter was sent out

Since June, a monthly DEDIPAC newsletter has been distributed. This newsletter is a summary of all news items that appeared on the website (since the last newsletter). The newsletter is send to all members of the consortium and open to everyone who subscribes on the website. Currently, there are approximately 400 subscribers. The first newsletter was opened by 50 percent of the receivers; all subsequent newsletters were opened by 30-40 percent of the receivers.

June 2014: Publication guidelines in place

These guidelines were established to guide researchers from the consortium in the development of scientific publications. Knowledge Hub members planning a presentation or publication are asked to upload a presentation/publication proposal conform a pre-set template onto the Partner Portal. All DMT members will be notified and are asked to respond within 5 (for presentations) or 31 (for publications) days; lack of response will signal agreement. Until 30-11-2016 71 proposals were uploaded, all of which were accepted.

August 2014: First Deliverables ready

- Deliverable 1.3.1: interim report on identified measurement methods for a pan-European surveillance framework

- Deliverable 3.1.1: report of consensus on how to define good practices for policies or multi-component interventions
- Deliverable 3.2.1: report on policy monitoring and evaluation based on literature search and rapid review
- Deliverable 3.3.1: report on multi-component intervention monitoring and evaluation based on literature search and rapid review

October 2014: Communication/Dissemination Plan in place
This plan contains the structure of the internal communication within the consortium as well as the external dissemination to stakeholders and other relevant parties.

November 2014: DEDIPAC design paper published
The DEDIPAC design paper was submitted to IJBNPA May 2014. In August, the reviewers asked for revisions, after which a revised paper was resubmitted. It was published early November.[8]

November 2014: Annual Report 2014
The Annual Report 2014 was prepared and delivered in time.

May 2015: Periodic Report
Deliverable 0.1.4, the Periodic Report, was published in time. This report discusses the first half of the funding period of DEDIPAC and is publicly available on the DEDIPAC website.

May 2015: Open to new partners
Since the second half of the funding period new partners were able to enter the consortium, although as of that date DEDIPAC was not actively seeking to expand. A new partner was able to join the Knowledge Hub if the following conditions were met: 1) the new partner signs the Consortium Agreement (CA), 2) there is a proposal discussing the foreseen work, the alignment within DEDIPAC and the added value for DEDIPAC, and 3) the new partner secures own funding for the proposed work. Three candidates expressed interest in joining DEDIPAC, one of which (Metropolitan University College, Denmark) has found proper alignment and is now part of the DEDIPAC consortium.

May 2015: Workshop at EXPO Milano
We were invited by the European Commission to organize a workshop at the EXPO Milano 2015 in the European Commission pavilion. Johannes Brug chaired the workshop titled “DEDIPAC presents: ‘Physical activity & sedentary behaviour surveillance & assessment – maximising Europe’s resources’.” Approximately 50 participants were involved in the interactive workshop, with introductions by representatives of DEDIPAC, the World Health Organization and Nike.

June 2015: Presence at ISBNPA annual meeting
DEDIPAC had a strong presence at the International Society of Behavioral Nutrition and Physical Activity (ISBNPA) annual meeting June 4-6 in Edinburgh, with three symposia, several oral

[8] Lakerveld J, et al. Towards the integration and development of a cross-European research network and infrastructure: the DEterminants of DIet and Physical ACtivity (DEDIPAC) Knowledge Hub. International Journal of Behavioral Nutrition and Physical Activity. 2014;11:143. doi: 10.1186/s12966-014-0143-7.

presentations and a 2-day satellite meeting. The DEDIPAC symposia were focused on 1) the determinants of sedentary behaviour across the life span, 2) DEDIPAC as a whole (Milestone 0.1.6 'In progress symposium on research in DEDIPAC held at an international scientific conference') and 3) mapping the determinants of dietary behaviour and physical activity/sedentary behaviour in minority ethnic groups. The satellite meeting was a synthesis and consensus meeting on determinants of sedentary behaviour across the life course and was held June 8-9 in Glasgow.

June 2015: Live DMT meeting

During the ISBNPA annual meeting, we also organized a live DMT meeting with the DMT-members who were present at the conference, providing the opportunity to meet face-to-face.

June 2015: JPI HDHL meeting Brussels

We were invited to present DEDIPAC at the 3rd International Conference on the JPI HDHL. Jeroen Lakerveld from the coordinating team gave a plenary presentation, and there was a DEDIPAC parallel session in the afternoon.

July 2015: Statistical Analysis Workshop

The data pooling taskforce, responsible for the pooling of determinant data in TA2, organised a 2-day statistical analysis workshop in Amsterdam early July. The workshop consisted of lectures, hands-on tutorials and WP-specific working meetings, all focused on data pooling.

October 2015: Economic evaluation workshop

During a TA3 meeting in Aberdeen, TA3 partners were welcome to join an economical workshop. This workshop mainly focused on the economical evaluation part of the toolbox and discussed how this section of the toolbox could be optimized. In addition, partners were able to consult economics' experts how they could handle an economical evaluation in their natural experiments.

October 2015: Consortium Agreement in place

The first draft of the consortium agreement (CA) was developed at the coordinating office. It was circulated among all partner institutes on 16 July 2014. Feedback and comments were addressed and a revised version was circulated on September 3rd, 2014, with a point-by-point indication which suggestions were implemented. Then further comments based on the revised version were addressed and a final version was circulated on October 17th, 2014, again with a feedback document indicating what was done with all comments. The final version was signed by most –but not all – participants. In consultation with the Steering Committee we then put further efforts in getting the CA signed by all partners. With a written agreement from the Steering Committee on putting the CA into force, the finalised version of the CA was circulated on 8 October 2015.

October 2015: live DMT meeting

In October there was a 2-day live DMT meeting in Amsterdam. The first day was dedicated to discuss any updates/issues and upcoming tasks, and was closed by an informal dinner. On the second day, different ways of continuing DEDIPAC after the end of the funding period were discussed and actions to take this forward were planned.

November 2015: Annual Report 2015

The Annual Report 2015 was prepared and delivered in time.

February 2016: Inventory graduate programs online

An inventory of graduate programs with DEDIPAC institutes is available on the public DEDIPAC website. This inventory provides early-career scientists with an overview of available master programs, single courses and summer- and winter schools.

June 2016: Agreement toolboxes

A 'gentlemen's agreement' has been signed by the key partners from the coordinating team and TA1, 2 and 3. This agreement states that the DEDIPAC toolboxes are licensed under the Creative Commons Non-Commercial-Share-Alike license, and that people within DEDIPAC planning to use the toolbox under this license agree to invite key DEDIPAC partners to be involved.

June 2016: Presence at ISBNPA annual meeting

DEDIPAC had a strong presence at the ISBNPA annual meeting June 9-11 in Cape Town, with two symposia, and three poster presentations. The DEDIPAC symposia were focused on 1) the development and relevance of multidisciplinary frameworks of determinants of dietary behaviour, physical activity and sedentary behaviour across the life course and in vulnerable groups, and 2) youth and adult physical activity, sedentary and dietary behaviour surveillance systems and population levels across Europe.

September 2016: DEDIPAC Ireland symposium

The Irish DEDIPAC partners have organised a one-day national symposium on September 7th in Dublin. The meeting brought together all the Irish DEDIPAC partners to exchange knowledge and disseminate research findings from this HRB-funded JPI.

October 2016: final DEDIPAC symposium

Almost 200 researchers, policy-makers and other interested parties gathered in the Universitätsclub in Bonn (Germany) for the final DEDIPAC symposium. After a warm welcome by dean Peter Stehle and organiser Ute Nöthlings, coordinator Johannes Brug opened the meeting. TA-leaders Pieter van 't Veer, Nanna Lien and Ilse de Bourdeaudhuij presented an overview of their TAs, followed by parallel sessions focused on the work of the early-career scientists and some of the highlights of the last three years. In the evening, everybody boarded the 'Rheinprinzessin' for an informal dinner and an entertaining keynote by Annie Anderson, assisted by Antje Hebestreit and Catherine Woods. The second day was focused on the future of DEDIPAC, with parallel sessions discussing possible avenues, after which Johannes Brug closed the meeting and thanked everyone for their contributions.

November 2016: all Deliverables delivered

All Deliverables were prepared and delivered in time. The only exception is Deliverable 0.1.5 "Manuscript summarising and integrating the results from TA1-3". This Deliverable was scheduled for Month 36, but will include results that are due in that same month. In order to provide a complete and truly informative summary and a proper integration of all DEDIPAC results, the deadline for this Deliverable was extended until the end of February 2017.

November 2016: Final Report

The Final Report was prepared and delivered in time.

Deviations from the work plan and failures, if any

The Finnish partners indicated that their national funding body was not able to secure DEDIPAC finances. The Finnish consortia notified the DMT that they could not participate in DEDIPAC anymore, and wished to be retracted from te Knowledge Hub. This has been discussed and aligned with the DEDIPAC Steering Committee.

Any other important events that affected the project

Not applicable

Any other important comment

Not applicable

Dissemination

We have aimed to make all outcomes of the DEDIPAC Knowledge Hub publically available on the DEDIPAC website. The only exception was made for manuscripts that were not yet accepted for publication by a scientific journal, as publishing these manuscripts on the website may hinder publication. These manuscripts will, however, become available once they are accepted.

Thematic Area 1: Assessment and harmonisation of methods for future research, monitoring and evaluation of interventions

General achievements

Achievement 1. Toolbox on suitability of tools for research, surveillance and interventions.
Toolbox. TA1 took the lead in developing the DEDIPAC toolbox for assessment methods relevant for research, monitoring and evaluation. The toolbox is structured in three levels. The first level provides entry to select the age group and outcome of interest (diet, physical activity, sedentary behaviour, determinants). The second level provides information on the tools: study, instrument, reference period, mode of application, countries applied, study type, validation, links to publication and other external sources. The third level gives in-depth information on measurement properties (validity, reliability and sensitivity) of the different methods. It distinguishes –when possible- criterion validity (against a gold standard), concurrent validity (against another method) and construct validity (against the claimed outcome). Regarding reliability it addresses several sources of variability, e.g., within/intra individual, between instruments and test-retest reliability. The information on measurement properties includes the study details, reference instrument, reference period, countries in which the study was carried out, validity, reliability and sensitivity statistics and a link to the publication(s). The information in the toolbox is based on the different SLRs. The inventory, prioritization and assessment of measurement properties of the methods and tools for determinants was performed for diet and for physical activity and sedentary behaviour separately, in collaboration between TA1 and TA2.

Determinants. For diet, more than 300 distinct determinants of diet were identified by the partners in TA2 (WP2.1.), which was narrowed down to 10 core lifespan determinants by the task-leaders. For this subset of 10 core lifestyle determinants best-practice methods were assessed, usually multiple methods for each determinant. As an exhaustive SLR on validity and reliability of all available studies was beyond the scope of TA2, the instrument that was most frequently used, and for which reliability and validity was most adequately described in the original article, was selected for the final list, i.e.: self-regulation, eating motives, health and taste attitudes, self-efficacy, physical activity, sleep characteristics, neophobia (specific to children), parental feeding strategies (specific to children), oral status (specific to older adults), (in)dependence in daily living (specific to older adults).
For physical activity and sedentary behaviour, a list of key determinants was provided by WP2.2 and WP2.3. This list contained 60 determinants of physical activity and sedentary behaviour across all age groups (children/adolescents, adults, elderly). An SLR for all determinants was not feasible within task 1.2.5 due to limited resources for this major task. Instead, in order to provide an overview of validated methods that assess key determinant of physical activity and sedentary behaviour in a specific age group, publications reporting measurement properties of methods assessing key determinants of physical activity and sedentary behaviour in children and adolescents were identified in two steps. In a first step, an evidence-based selection of key determinants of physical activity and sedentary behaviour was targeted. Therefore, the literature was screened to identify SLRs that reported key determinants of physical activity and sedentary behaviour in children and adolescents, which resulted in a number of 16 key determinants, nine for physical activity (age, sex, self-efficacy, perceived behavioural control, social support, previous physical activity, intention, ethnicity, planning) and seven determinants for sedentary behaviour (age, body weight status, screen time, playground density, play and sports equipment at school, extension of morning and

lunch breaks). As instruments measuring sex, age and ethnicity are difficult to validate we did not pursue the literature search for these determinants. Previous physical activity was excluded because physical activity methods have been evaluated simultaneously in another DEDIPAC task within WP1.2. In a second step, a separate literature search was conducted for each of the key determinants to identify studies that validated methods assessing the determinants identified in the first step. For the remaining key determinants of physical activity and sedentary behaviour in children and adolescents, measurement properties (i.e. validity, reliability, and sensitivity) will be provided in the DEDIPAC toolbox.

Achievement 2. Innovative methodologies for pan-European research and monitoring.

Innovative methods for research (for diet, physical activity and sedentary behaviour) usually aim at time-integrated levels of exposure, i.e. the long-term average or habitual exposure of an individual. However, as determinants of these behaviours are often acting on a shorter timeframe, such methods are not well-suited to study the relation between time-varying determinants in daily life to specific dietary or PA/SB behaviours (e.g. food choice, TV-time, mood). New objective methods are needed to assess individual level behaviours within their time- and space-specific context, and could allow for including psychosocial determinants. The technologies for this development are increasingly available. TA1 developed a mobile phone application-based method to simultaneously assess the intake of sugar-sweetened beverages by means of recall, product scanning and GPS and with potential extensions to include psychosocial factors. Feasibility was tested in 2 waves totalling 83 university students in three countries (GE, NL, NO). Preliminary results suggest an acceptable compliance for using the application (60%). According to this preliminary prototype 5-10% of all drinks are sugar-sweetened beverages; of these the GPS was registered by 15-65% of sugar-sweetened beverages and the barcode for 15-30%. Further development of the prototype seems warranted, e.g. for future monitoring or cohort studies.

Innovative methodology for surveillance systems aimed at the development of questionnaires for the assessment of sedentary behaviour and its determinants combined with the activPAL-device as an objective method for assessing sedentary behaviour. Currently, sedentary behaviour in children and adolescents is not comprehensively assessed in European surveillance systems (often only single domains like media use are included which accounts for little explained variance in total objectively measured sedentary time) and none of the existing pan-European surveillance systems uses objective assessment methods to collect data on sedentary behaviour. The feasibility testing of this new method showed that, overall, the novel questionnaires proved to be feasible for surveillance purposes. Further insights in the suitability of the questionnaires will be provided once the sedentary behaviour questions will have been validated against activPAL data. The activPAL or similar postural measurement devices itself are considered suitable devices for measuring sedentary behaviour for surveillance purposes. However, the costs of these devices combined with the time required for data download, management and analysis need to be considered prior to implementation. Administration of these devices in subsamples of surveillance system could be a solution to reduce costs.

Achievement 3. Roadmap towards harmonised pan-European surveillance systems

The inventory and survey showed that the majority of the 50 surveillance systems in Europe focus on food and nutrient intake and physical activity, and much less information is collected on sedentary behaviour and dietary behaviour; regarding target groups children are underrepresented as compared to adults. The established expert panel with representatives from WHO-COSI, HBSC, EU

Menu, GloboDiet, EHIS and the “Nordic Monitoring of Diet, Physical Activity and Overweight”, the German national surveillance system KiGGS and other stakeholders concluded that the future harmonised pan-European surveillance system should build on already existing surveillance systems rather than establishing a completely new system. The following main steps were suggested for the roadmap that will be summarised in a manuscript: (1) development of an overall conceptual framework for a harmonised pan-European surveillance system including questions to be addressed, rationale for the areas of interest and summary of overall strategy, (2) selection of indicators at the individual- and setting-level for the different health behaviours of interest and their determinants, (3) identification of established/validated instruments for measuring the indicators, (4) conducting a methodological study to calibrate the currently used instruments with a short set of common items. Depending on steps (1) to (4), subsequent steps may entail the (5) establishment of a methodological competence centre to support further harmonisation of existing systems, (6) creation of cross-links to research and (7) exploration of fund raising strategies for the further development and maintenance of a harmonised pan-European surveillance system.

***WP1.1*: Assessment and harmonisation of assessment of dietary intake and dietary behaviour**

Achievements
The proposed work in WP1.1 was delivered according to schedule.

As part of **Task 1.1.1** we conducted a successful workshop in Potsdam in February 2014 to train partners on how to do SLRs, and to harmonise the systematic review methodology. During the first year we drafted 9 protocols for SLRs aimed to identify studies assessing dietary intake and/or meal patterns with similar methods in more than one European country, and assessment methods of dietary patterns used to describe real world patterns of food consumption or adherence to dietary recommendations in European countries. All SLRs have been completed in the summer of 2016 and two of the SLRs on methods used for assessing intake of sugar-sweetened beverages and fruits and vegetables in a pan-European setting have already been published[9]. The overall aim of Task 1.1.1 is to develop a toolbox with state-of-the art methods to assess dietary intake, dietary behaviour and their determinants, based on their quality and suitability to be used in pan-European settings. The above-mentioned SLRs have indirectly identified assessment methods used to measure dietary intake and/or dietary behaviour and dietary patterns across European countries. To inform the toolbox, all partners involved in SLRs have compiled relevant information in terms of dietary dimension, basic study characteristics, age group, area of application as well as information on European regions the instruments have been applied and information on validation status using a standardized form. Detailed information on validation studies have been systematically collected for most of the different instruments as well. Core determinants of dietary intake have been identified in TA2, and their assessment has been similarly reviewed and information compiled by partners of Task 1.1.1 as well as TA2. Aims and draft versions of the toolbox have been discussed within TA1 to potentially harmonise approaches across different tasks (toolbox on physical activity and sedentary behaviour), with the DMT as well as with TA3 (Workshop April 2016). Discussion with the DMT about the required structure of a web-platform that will be used for the toolbox has started in spring 2016 and will continue, also in the light of sustainability of the toolbox.

Task 1.1.2 aims to *describe the variation in dietary intake and dietary behaviour by demographic variables across Europe.* There are currently two SLRs in progress as part of this task. These SLRs aim to identify the demographic variation in 1) meal patterns and 2) sugar-sweetened beverages among children and adults. The meal pattern SLR is near completion and will be submitted for publication early 2017, while the sugar-sweetened beverage SLR will be finalized by the end of grant. Further work on 1.1.2 aimed to perform secondary analyses in pan-European studies to fill those knowledge gaps identified in the SLRs. Data sources available to us for secondary analysis were identified during the first year of the project. The pan-European studies ProChildren and HELENA were negotiated to be available. A *workshop on secondary data analysis* was conducted in Cork in March 2015 where the

[9] Riordan F, et al. A systematic review of methods to assess intake of sugar-sweetened beverages among healthy European adults and children: a DEDIPAC (DEterminants of DIet and Physical Activity) study. Public Health Nutrition. 2016;21:1-20. doi: 10.1017/S1368980016002639.

Riordan F, et al. A systematic review of methods to assess intake of fruits and vegetables among healthy European adults and children: a DEDIPAC (DEterminants of DIet and Physical Activity) study. Public Health Nutrition. 2016;14:1-32. doi: 10.1017/S1368980016002366.

main topic was to discuss different proposals for secondary analysis. In addition, there were lectures and discussions on some relevant statistical aspects. A paper titled *"Correlates of irregular family meal patterns among European 6th graders in the Pro Children study*" is ready for submission. A second manuscript examining the associations of breakfast skipping with overweight/obesity in European adolescents, based on a secondary analysis of the HELENA dataset, is planned for submission in December 2016.

Task 1.1.3 aims *to develop an innovative integrated method to assess dietary intake, dietary behaviour, physical activity, sedentary behaviour and their determinants for application in future studies*. An expert workshop was conducted in May 2014 to identify the most important diet, physical activity and sedentary behaviour-related public health challenges across the life course. The public health challenges chosen were sugar-sweetened beverages, healthy vs. unhealthy beverages, physical activity and their determinants in young adults aged 18-30 yrs. A working meeting in Mainz took place in October 2014 where the roadmap of implementation and feasibility testing were refined. A training session with all partners was conducted in Mainz in June 2015. The test version of the innovative integrated method was available in August 2015 with components for sugary drink assessment (self-report, multiple choice, bar code scanning), accelerometry with a dedicated device, and a self-report component for the assessment of selected determinants and mediators. In September 2015, a test run was conducted in Mainz, and in October 2015 in Oslo. The first wave of data collection started in November 2015 in Mainz and in December 2015 / January 2016 in Oslo and Amsterdam (this in close collaboration with WP1.3, Task 1.3.2). A second wave of data collection with an improved version of the integrated method started in March 2016 at the Mainz and Bremen sites and was completed in July 2016. A technical report including the feasibility study findings is in preparation and will be submitted to a peer-reviewed journal on wearables and ubiquitous computing.

Deviations from the work plan and failures, if any
Not applicable

Any other important events that affected on the project
Not applicable

Any other important comment
Not applicable

***WP1.2*: Assessment and harmonisation of assessment of physical activity and sedentary behaviours**

Achievements

Above all, five manuscripts have been published, another eight manuscripts are either submitted or in preparation. A toolbox for methods for assessing sedentary behaviour and physical activity has been developed. Below is a short summary of the work conducted in each of the tasks.

Task 1.2.1 has delivered its work according to plan. Four SLRs on the variation in population levels of sedentary time and physical activity in European young people and adults have been published as a series in *International Journal of Behavioural Nutrition and Physical Activity* in 2016[10] and the review protocols were uploaded to the PROSPERO register for SLRs (http://www.crd.york.ac.uk/PROSPERO). Another manuscript titled "Sedentary time and physical activity surveillance through accelerometer pooling in four European countries" pooling data on objectively measured sedentary time and physical activity from four European countries has been submitted for publication and is currently under review.

Task 1.2.2 has delivered its work according to plan. The end product was an original publication examining the agreement between different self-report instruments and objectively measured physical activity for assessing the prevalence of sufficiently active adults in European men and women[11].

Task 1.2.3 aims to harmonise objectively measured data on physical activity and sedentary time in young people across European studies. Data from the European Youth Heart Studies, the International Children Accelerometer Database (ICAD), the HELENA study and the IDEFICS study and other national and international data sets that included data from at least 400 participants, in total comprising data from more than 45,000 young people from at least 18 European countries, have been secured, cleaned, processed and is currently analysed (see summary of results in section '*Secondary data analyses of pan-European dataset ' above)*. A confidential report was delivered by month 36 and a manuscript to be submitted to a peer-review journal on the prevalence of

[10] Verloigne M, et al. Variation in population levels of sedentary time in European children and adolescents according to cross-European studies: a systematic literature review within DEDIPAC. Int J Behav Nutr Phys Act. 2016;13:69. doi: 10.1186/s12966-016-0395-5.

Loyen A, et al. Variation in population levels of sedentary time in European adults according to cross-European studies: a systematic literature review within DEDIPAC. Int J Behav Nutr Phys Act. 2016;13:71. doi: 10.1186/s12966-016-0397-3.

Van Hecke L, et al. Variation in population levels of physical activity in European children and adolescents according to cross-European studies: a systematic literature review within DEDIPAC. Int J Behav Nutr Phys Act. 2016;13:70. doi: 10.1186/s12966-016-0396-4.

Loyen A, et al. Variation in population levels of physical activity in European adults according to cross-European studies: a systematic literature review within DEDIPAC. Int J Behav Nutr Phys Act. 2016;13:72. doi: 10.1186/s12966-016-0398-2.

[11] Steene-Johannessen J, et al. Are Self-report Measures Able to Define Individuals as Physically Active or Inactive? Med Sci Sports Exerc. 2016;48(2):235-44. doi: 10.1249/MSS.0000000000000760.

objectively measured sedentary time and physical activity in European youth will follow (Deliverable 1.2.4). The work was conducted according to plan.

Task 1.2.4 aims to suggest state of the art methods to assess physical activity and sedentary time/behaviours and to develop an open access web based toolbox including these instruments. The work is ongoing and includes two 'reviews of reviews' summarising the available evidence on the reliability, validity and sensitivity for various assessment methods for physical activity, one review for methods in children and one for adults. The work also encompasses new SLRs on the validity and reliability of sedentary behaviour measurements, also in children and adults separately. The four reviews will be the most extensive SLRs of method validity and reliability to date. In addition, a substantial database of method validity and reliability has been created in the reviewing process; this will be made available to researchers via the DEDIPAC toolbox. Protocols for the SLR of reviews for physical activity and the SLR for the assessment of sedentary behaviours have been uploaded to PROSPERO (http://www.crd.york.ac.uk/PROSPERO). A first manuscript on physical activity assessment methods in adults has been drafted and has been submitted to a peer reviewed journal, and the second manuscript on physical activity measurement in children and youth is in draft form. Despite the complexity and the large amount of work undertaken in this task the Deliverables (1.2.5 and 1.2.6) from this tasks were delivered as a report by Month 36, while the manuscripts of Deliverable 1.2.5 will be finalised and submitted for publication early 2017.

Task 1.2.5 aims to assess the validity and reliability of methods to assess key determinants of physical activity and sedentary behaviour. The task has identified 11 key determinants on psychometric properties of methods assessing 11 key determinants in children and adolescents. The methods used to measure the determinants are currently being extracted. Despite the complexity and the large amount of work undertaken the Deliverable (1.2.7) from this task was delivered by Month 36 as a confidential report, while a manuscript to be submitted for publication will follow.

Deviations from the work plan and failures, if any
Not applicable.

Any other important events that affected the project
Not applicable

Any other important comment
Not applicable

***WP1.3*: Pan-European harmonisation of research and surveillance regarding dietary, physical activity and sedentary behaviours and their key determinants**

Achievements

Task 1.3.1: Identify, review and select methods suitable for a pan-European surveillance system
An overview of instruments used in on-going national and pan-European surveillance systems for the assessment of several health behaviours in all population groups was compiled (Deliverable 1.3.1). After the evaluation of the inventory of ongoing surveillance systems (Subtask 1.3.3.1) and the decision about the focus of the feasibility study for surveillance purposes (Subtask 1.3.2.1), appropriate existing instruments were adapted and integrated into a novel instrument suitable for the subjective assessment of sedentary behaviour and its determinants in children and adolescents (Deliverable 1.3.2). The novel instrument was combined with an objective assessment method of sedentary behaviour and a manual containing the Standard Operating Procedure. The instrument was adapted after the results from the feasibility testing were obtained (Deliverable 1.3.3).

Task 1.3.2: Feasibility studies of innovative, integrated assessment methods
Subtask 1.3.2.1 Feasibility study for research
The novel smartphone-based method for the assessment of sugar-sweetened beverage consumption in young adults developed within Task 1.1.3 was tested in four survey centres in three countries, i.e. Mainz and Bremen (Germany), Wageningen (The Netherlands) and Oslo (Norway). The feasibility testing indicated that the integrated method appears feasible and suitable to answer complex research questions, at least in the population studied (Deliverable 1.3.4), i.e. university students (N=83). Further exploration in more diverse populations is now warranted.

Subtask 1.3.2.2 Feasibility study for surveillance
The inventory of ongoing surveillance systems (Subtask 1.3.3.1) revealed a gap in the assessment of sedentary behaviour in children and adolescents. Therefore, the feasibility study for surveillance purposes focussed on this behaviour and its determinants in primary school children and adolescents. The study took place in three survey centres: Bremen and Berlin (Germany) and Limerick/Dublin (Ireland). In general, the novel instrument was found to be suitable for use in surveillance although some adaptions were warranted (Deliverable 1.3.5). In total, 240 primary and secondary school students were examined.

Task 1.3.3: Roadmap towards a standardised pan-European surveillance system
Subtask 1.3.3.1 Gaps and needs for a pan-European surveillance system
An inventory of national and pan-European surveillance systems has been compiled which comprised 50 surveillance systems. The evaluation of the inventory showed that dietary and sedentary behaviours are not covered as frequently as dietary intake and physical activity. Overall, there was a lack of surveillance systems including children (Deliverable 1.3.6). A manuscript has been submitted for publication to a peer-reviewed journal.

Subtask 1.3.3.2 Interaction between research infrastructures and a pan-European surveillance system
An e-mail survey was conducted among potentially relevant European Strategy Forum on Research Infrastructures-Biological and Medical Science Research Infrastructures asking about resources available within the respective research infrastructure or needed from other research

infrastructures. The replies of 7 out of 10 research infrastructures serve to describe the 'resource landscape'. The material allows matching core competences and urgent needs in a simple way. This first part of the report (Deliverable 1.3.8) is complemented by a second part that aims specifically at identifying those research infrastructures that may be most useful for DEDIPAC in the future, and, conversely, those for which DEDIPAC may provide resources.

Subtask 1.3.3.3 Development of a roadmap

Several occasions were used to establish contacts with existing surveillance systems (e.g. participation in a workshop of WHO-COSI in Dubrovnik, May 2015). Most importantly, a workshop was organised with representatives of all pan-European surveillance system (WHO-COSI; HBSC; EU Menu; GloboDiet; EHIS; Nordic Monitoring of Diet, Physical Activity and Overweight), one national surveillance system (KiGGS, Germany) and other stakeholders which took place in Bremen in April 2016. This panel of experts agreed that a future harmonised pan-European surveillance system should build on already existing surveillance systems rather than establishing a completely new system. Several steps were suggested for achieving standardised data collection across the existing systems that will be summarised in a publication manuscript. The results from the workshop were complemented with further information and are described in Deliverable 1.3.10.

Deviations from the work plan and failures, if any

1. Deliverable 1.3.2 (preliminary toolbox) was delivered 6 months later than planned without impairing the overall progress of the other work in this WP, the TA or the DEDIPAC program. The main reason for the delay was the dependency on the results of other WPs. However, the feasibility study for surveillance purposes was not endangered by the delay.
2. The launch of the feasibility study for research purposes (Subtask 1.3.2.1) did not take place for all centres at the same time and therefore data collection took longer than planned. The delay was caused by technical problems. However, all data were collected by July 2016.
3. Deliverable 1.3.5 (feasibility study for surveillance purposes, Subtask 1.3.2.2) included Bremen data only. The revision of the toolbox was also based on these results (Deliverable 1.3.3). The reason for the delay was that data collection in school-settings required attention to special regulations, school holidays, etc. which resulted in a longer data collection period. Nevertheless, the Bremen dataset itself has a large sample size (120 participants) and the data from all centres involved in Subtask 1.3.2.2 will be included in subsequent analyses and planned publications.
4. Partner 130 (Bremen) took over the responsibility from partner 142 (Ulm) for Deliverable 1.3.3. The toolbox was mainly developed in Bremen and also tested there. Due to the local distance to partner 142, difficulties in exchange of information were anticipated. Therefore, the responsibility for the amendment of the toolbox was shifted.

Eventually, all goals planned for this reporting period were achieved by WP1.3, and all Deliverables delivered.

Any other important events that affected on the project

Not applicable

Any other important comment

Not applicable

Thematic Area 2: Determinants of dietary behaviour, physical activity and sedentary behaviour across the life course and in vulnerable groups

General achievements

The overall objective of TA2 "Determinants" was to provide the pan-European research community with trans-disciplinary frameworks of determinants of dietary, physical activity, sedentary behaviours and social inequalities, including best-practice methods to analyse data based on such frameworks and identification of gaps in current research. In order to achieve this there was also a general objective to establish trans-disciplinary European research networks on determinants of dietary, physical activity, sedentary behaviours and social inequalities. The purpose of these objectives was to ensure that the partners from different disciplines developed a common understanding of the determinants influencing the behaviours, explored new methods for analysing data and established critical mass of researchers that could continue this work and fill the identified gaps.

Year one

The WPs started off by getting an overview of the partners to be involved in each network based on their expression of interest. Thereafter the formal structure and administrative routines suitable to the size of the WPs were established.

The outcomes of the frameworks were defined. The need for reviews of different types was determined based on the current availability of original articles and reviews. Alongside this the partners provided their views on the determinants by age groups for the various behaviours, and collected information about measures and methods used to assess core determinants of the behaviours across the life course.

The data pooling task force across TA2 and TA1 was established and compendium of the initial 120 datasets with potential for conjoint analysis. WP2.1 started planning their first regular secondary data analysis.

Year two

In this year work was being done on 19 reviews (systematic/mapping/umbrella). Two out of the three reviews on determinants of sedentary behaviours by age group were published.[12]

The frameworks were presented to external experts either at conferences (WP2.3 and WP2.4) or by online surveys (WP2.1 and WP2.2). The frameworks were generally well received, but also improved through the inputs from the external experts. All the determinants were rated on modifiability, importance for research and potential population effects. All the results were being reported and

[12] Stierlin AS, et al. A systematic review of determinants of sedentary behaviour in youth: a DEDIPAC-study. International Journal of Behavioral Nutrition and Physical Activity. 2015;12:133, doi: 10.1186/s12966-015-0291-4.

Chastin SFM, et al. Systematic literature review of determinants of sedentary behaviour in older adults: a DEDIPAC study. International Journal of Behavioral Nutrition and Physical Activity. 2015;12:127, doi: 10.1186/s12966-015-0292-3.

described in conceptual papers on the frameworks. Alongside this work an internal report was written regarding measures and methods used to assess core determinants of the behaviours across the life course. This report was given to TA1 and TA3 for their further work.

The work with the compendium continued with further discussions with regards to the possibilities for harmonization or pooling versus federated meta-analysis. A statistical workshop and writing retreat was organized across WPs, and in addition WP2.1 had 2 writing retreats. The process of negotiating access to the data sets for harmonization/pooling was started.

Year three

In the last year of DEDIPAC the networks have written reports about their organization and plans for the future.

The frameworks were presented and discussed at an international symposium embedded within the annual meeting of ISBNPA in Cape Town in June 2016, and at the final DEDIPAC-symposium in Bonn in October 2016. The conceptual papers on the framework of the determinants of sedentary behaviour and physical activity have been published[13], whereas the other two are under review at scientific journals.

Three additional reviews (one on sedentary behaviour[14] and two on diet[15]) were published. In total, 6 reviews are submitted and another 7 are being worked on. The first publication on a secondary analysis was published[16] and another 5 are submitted, while another 20 are being worked on and will be submitted within the next 6 months. In addition to these manuscripts a taxonomy paper on dietary outcomes is ready to be submitted from WP2.1 (diet). WP2.3 (sedentary behaviour) together with WP2.2 (physical activity) has submitted a methods paper on task 2 in which the methodology of retrieving the datasets and pooling and harmonizing was explained. WP2.3 has also submitted a position paper outlining the need for a pan-European cohort to answer the different research questions on sedentary behaviour.

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[13] Chastin SFM, et al. The SOS-framework (Systems of Sedentary behaviours): an international transdisciplinary consensus framework for the study of determinants, research priorities and policy on sedentary behaviour across the life course: a DEDIPAC-study. Int J Behav Nutr Phys Act. 2016;13:83. doi: 10.1186/s12966-016-0409-3.

Condello G, et al. Using concept mapping in the development of the EU-PAD framework (EUropean-Physical Activity Determinants across the life course): a DEDIPAC-study. BMC Public Health. 2016;16:1145. doi: 10.1186/s12889-016-3800-8.

[14] O'Donoghue G, et al. A systematic review of correlates of sedentary behaviour in adults aged 18-65 years: a socio-ecological approach. BMC Public Health. 2016;16:163. doi: 10.1186/s12889-016-2841-3

[15] Stelmach-Mardas M, et al. Seasonality of food groups and total energy intake: a systematic review and meta-analysis. Eur J Clin Nutr. 2016;70(6):700-8. doi: 10.1038/ejcn.2015.224.

Symmank C, et al. Predictors of food decision making: A systematic interdisciplinary mapping (SIM) review. Appetite.

[16] Si Hassen W, et al. Socioeconomic Indicators Are Independently Associated with Nutrient Intake in French Adults: A DEDIPAC Study. Nutrients. 2016; 8(3):158. doi:10.3390/nu8030158

***WP2.1*: Determinants of dietary behaviours across the life course**

Achievements

The *determinants of diet* network is comprised of all DEDIPAC members contributing to WP2.1, "determinants of diet", which has grown from 91 to over 100 scientists representing 40 different institutes and 11 European countries. The members represent 23 different DEDIPAC partners. The network is highly interdisciplinary, including 21 different scientific fields. The network is also diverse when taking into consideration the life stage on which members' research typically focuses. Of the members, 15 percent mainly investigates dietary behaviour in children and / or adolescents, 65 percent in adults and 20 percent in older persons. The work has been led by a management team consisting of the two WP-leaders, the task-leaders (see tasks below) and the four subgroup-leaders by age group study populations (early childhood, 2 on adults, elderly). The management team has held biweekly (conference call) meetings including a TA2-leader and the minutes have been made available to all partners through the internal DEDIPAC website. The management team has had 6 live meetings, and has communicated to the partners through 3 newsletters and task-specific e-mails. In addition, task 2 (see below) has had 5 live meetings and communicated via e-mail to the 29 partners involved in this task. The network is described in more detail in the report outlining the organization of a European trans-disciplinary research network on determinants of dietary behaviours (Deliverable 2.1.2).

Task 2.1.1: Mapping and defining determinants, relevant correlates and key research challenges of dietary behaviour across the life course.

In 2014, each subgroup contributed a list of core determinants of nutrition and eating, supplying measures and methods for each determinant. From this starting point, and strengthened with additional literature review, a final report on measures and methods used to assess core determinants of dietary behaviour across the life course was written and finalized, thus completing Deliverable 2.1.1. The report comprises three lists (one per age group children – adults – elderly) with determinants specifically relevant to each of these three groups, as well as a final list of core determinants, and the measures and methods used to assess them, across the life course.

A framework of determinants of dietary behaviour has also been created. As a first step towards developing this framework, the partners of Task 2.1.1 together created a taxonomy of outcomes (i.e. the outcomes of the determinants for which a framework was going to be created). A manuscript reporting this taxonomy of dietary outcomes (which was already outlined in the first annual report) will be submitted for publication before the end of 2016.

In subsequent steps, the determinants for the framework were supplied by the partners – these could result both from bottom-up (e.g. experience) as well as top-down (e.g. evidence based on literature review) processes. These literature review efforts have resulted in 9 reviews in various stages of progress (ranging from published[17] to in preparation), and two more are currently being considered. The determinants were first collected per subgroup and then integrated into a lifespan framework. After creating the framework, the determinants were rated on three dimensions;

[17] Stelmach-Mardas M, et al. Seasonality of food groups and total energy intake: a systematic review and meta-analysis. Eur J Clin Nutr. 2016;70(6):700-8. doi: 10.1038/ejcn.2015.224.

modifiability, relationship strength, and population-level effect. The ratings were done by the DEDIPAC partners and more than 100 external experts. Taken together, these three ratings provide an indication of priority for research and intervention of each determinant. A manuscript on the Determinants Of Nutrition and Eating (DONE) framework has been submitted (Deliverable 2.1.3). This manuscript is accompanied by a publicly available online tool to explore and interact with the framework and the determinants (www.uni-konstanz.de/DONE).

Task 2.1.2: Explorative secondary data analysis and further development of the dynamic and evolving framework of determinants of dietary behaviour.
This task started with a cross-TA2 WPs effort of identifying existing data sets from different disciplines across Europe including non-DEDIPAC countries of lower economic status that are relevant to understanding the determinants of dietary behaviours, physical activity and sedentary behaviour – see report from WP2.2 for more detail. The groups associated with this task were in principle following not only the top down approach suggested and performed also by the other tasks on secondary data analysis but also a bottom up approach meaning that groups interested in a specific research question joined their data in a federated way via meta-analysis. Resources for the top-down approach were mainly invested to compile the compendium of data sets. The bottom up approach was of more interest and better suited to be conducted within the time line of DEDIPAC.

The following research questions were addressed in the bottom up approach: sleep and beverage intake, meal patterns in regard to the distribution of energy and macronutrient intake over the course of the day, trends in number of meals per day with increasing age, seasonal changes in food intake and energy intake. This has resulted in 3 submitted manuscripts (Deliverable 2.1.4) and 11 more manuscripts that are being drafted.

The members of the secondary data analysis taskforce communicated via regular progress e-mails. A statistical workshop was organized in Amsterdam in July 2015 in collaboration with the other WPs. There were 5 persons from Task 2.1.2 participating in the workshop. Moreover, and on top of the general live meetings in WP2.1, the secondary data analysis taskforce have had 4 live meetings (December 2014-Potsdam, April 2015-Karlsruhe, November 2015-Bonn and April 2016-Berlin). The leaders of the secondary task force analysis are part of the overall management structure of the determinants of diet network, and have made regular progress updates on Task 2 in the biweekly internet conferences held by the management team, thus ensuring continued communication and alignment between the overall network management structure and the leaders of the secondary data analysis taskforce.

Deviations from the work plan and failures, if any
There have been a few minor delays and changes in methods as reported in previous annual reports, but none of these have caused any major issues or failures. There have not been further deviations in the last year of the project.

Any other important events that affected on the project
Not applicable

Any other important comment
Not applicable

***WP2.2*: Determinants of physical activity behaviour across the life course**

Achievements

The *determinants of physical activity* network involved 12 partners from 8 European countries, representing 25 organizations and involving 74 scientists listing 19 different areas of expertise. To progress each specific task and subtask, smaller working groups from the network were identified. The membership of these groups was based upon the original expression of interest submitted by each Partner. A WP handbook was prepared in Feb 2014 and was updated as required. Communications pathways were as follows: 1) WP-leader and deputy-leaders communicated on regular occasions using skype, e-mail and face-to-face meetings, 2) Communication with task groups involved e-mail guidance and updates and as required skype/teleconference. Partners were provided when relevant with detailed updates, which included guidance regarding relevant methodologies and timelines and these were both circulated and uploaded on the internal DEDIPAC website. Additionally, four face-to-face meetings/workshops with partners were organized, two for the 2.2.1. tasks (Rome, Italy: December 4- 5,2014; September 28-October 1, 2015) and two for the 2.2.2. tasks (Amsterdam, The Netherlands: July 1-3, 2015; Ghent, Belgium: March 16-18, 2016).The network is described in more detail in the report outlining the organization of a European trans-disciplinary research network on determinants of physical activity behaviours (Deliverable 2.2.2).

Task 2.2.1: Mapping and defining life course determinants, relevant correlates and key research challenges of physical activity behaviour.

A first step was to reach consensus on a DEDIPAC Knowledge Hub common nomenclature for physical activity; "Physical activity encompasses any bodily movement produced by skeletal muscles that results in energy expenditure, which may be unstructured and everyday life activity, exercise that includes prearranged, deliberate and repetitive activity, and grassroots sports and competitive sports." Next, using graphical representations for each stage of the life-span (youth: <19yrs; adults: 19-64yrs; and older adults: ≥65yrs), the research team identified a list of 183 factors potentially associated with physical activity based on both eminence and evidence. Further consolidation ((i.e., elimination of repetitions/) of this list was achieved via a consensus process resulting in 106 factors. These 106 factors were rated for population level effect and modifiability. Subsequently concept mapping software was used to collate European experts' views (N=79) views of the factors for each age group. The concept mapping resulted in six distinct clusters, broadly merged in two themes: 1) the 'Person', which included clusters 'Intra-Personal Context and Wellbeing' and 'Family and Social Economic Status' (42% of all factors) and 2) the 'Society', which included the remaining four clusters 'Policy and Provision', 'Cultural Context and Media', 'Social Support and Modelling', and 'Supportive Environment' (58% of all factors). Overall, 25 factors were rated as the most modifiable and impactful on physical activity behaviours across the life course. They were mostly situated in the 'Intra-Personal Context and Wellbeing' cluster. Furthermore, 16 of them were rated as top priority for research. This is further described in a published manuscript on the development of the EU-PAD framework (Deliverable 2.2.3).

The WP2.2 research team organized seven umbrella SLRs on the biological, psychological, behavioural, physical (e.g. environmental), socio-cultural, economic, and policy determinants of physical activity. A preliminary comparison between the EU-PAD framework and the probable or convincing evidence for determinants of physical activity summarized in the seven umbrella SLRs indicates only a 34% correspondence, and no umbrella SLRs showed probable or convincing evidence

for determinants of physical activity related to the factors in the cluster 'Cultural Context and Media'. These findings substantiate the need of future multi- and trans-disciplinary research on determinants of physical activity.

In 2014, a report was written regarding measures and methods used to assess core determinants of physical activity behaviour across the life course, and this was included in an overall report across WP2.1, WP2.3 & WP2.4, thus completing Deliverable 2.2.1.

Task 2.2.2: Explorative secondary data analysis and development of a framework of determinants of physical activity behaviour.
An extensive search of the CORDIS project platform was administered (http://cordis.europa.eu/projects/home_en.html). The inventory was circulated among the DEDIPAC Knowledge Hub partners for confirmation of inclusion of relevant datasets. All identified datasets designated as having potential for harmonization and/or secondary analysis were listed, categorized and searchable within one file and all dataset owners were approached and asked whether the info was correct and up to date. This resulted in a compendium of European datasets (N=114) relevant to the determinants of diet, physical activity and sedentary behaviour.

During the statistical workshop across WP2.1, 2.2, 2.3, and 2.4, keynotes presentations covered the utility of the following for harmonisation/secondary data analysis: Bayesian analysis, meta-analysis, mediation/moderation analysis, longitudinal and multilevel analysis. Various approaches to harmonisation and tailored software platforms were considered. A further focus on the research questions which may be answered by secondary data analysis and/or harmonising existing European data was achieved. This work continued at a two-day writing retreat in Ghent, Belgium, March 2016. Currently four manuscripts are prepared covering: 1) Factors influencing physical activity behaviour: a system based analysis using Bayesian networks. 2) Variation in determinant profile for youth who participate in different levels of objectively measured physical activity and sedentary behaviour 3) Relations of physical activity and sedentary behaviour with Mental Health Outcomes and Relevant Biomarkers, and 4) A methodological paper on identifying and sharing data for secondary data analysis: general principles, consideration of the FAIR (Findable, Accessible, Interoperable, Re-usable) principles and an example from the DEDIPAC project. The focus of these manuscripts is thus primarily on gaining a greater understanding of the pattern of interaction among relevant determinants of physical activity behaviour using large datasets. In some cases advanced statistics such as Bayesian Network Analysis is being used to illuminate this interaction – this analysis may highlight a complexity of interaction not previously published. The analysis also provides proof of concept for the harmonisation of determinant variables using existing datasets.

Deviations from the work plan and failures, if any
There have been a few minor delays and changes in methods as reported in previous annual reports, but none of these have caused any major issues or failures.

Any other important events that affected on the project
Not applicable

Any other important comment
Not applicable

***WP2.3*: Determinants of sedentary behaviour across the life course**

Achievements

The *determinants of sedentary behaviour* network involved 8 partners from 6 European countries, and involved 23 individual scientists. The following fields of expertise were represented: Ageing science, Economics, Epidemiology, Exercise physiology, Gerontology, Health inequalities, Health promotion, Migration and public health, Nutrition, Physiotherapy, Psychology, Public health, Social sciences, Sociology, Sport and exercise science and Statistics. Furthermore expertise in all age groups was present (from toddlers to the older adults). The work has been led by a WP-leader and a deputy WP-leader. They communicated on a regular basis using skype, e-mail, GoToMeeting and face-to-face meetings. Additionally, monthly teleconferences (22 in total) were conducted with all partners within WP2.3 to discuss the progress within each task. Minutes of all teleconferences were uploaded on the internal DEDIPAC website. Furthermore, 8 live meetings (2 in Ghent, 1 in Glasgow, 1 in Edinburgh, 1 in Cape Town, 1 in Bonn and 2 in Amsterdam) were organized with the WP2.3-leaders and/or WP2.3 partners.

The network is described in more detail in the report outlining the organization of a European trans-disciplinary research network on determinants of sedentary behaviours (Deliverable 2.3.2).

Task 2.3.1 Mapping and defining life course determinants, relevant correlates and key research challenges of sedentary behaviour

To foster more effective research and address the gaps identified in the SLRs, the DEDIPAC consortium first established a taxonomy of sedentary behaviour.

Furthermore, this task has resulted in three SLRs on the determinants of sedentary behaviour (in youth, adults and older adults), which all have been published. The included studies were predominantly conducted in Europe, the US, and Australia. Most studies were limited to TV or 'screen' time rather than overall sedentary behaviour and relied on self-report. Furthermore the SLRs revealed a lack of studies using qualitative research methodologies as well as studies looking into the more motivational and contextual potential determinants of sedentary behaviour.

Through an international consensus process, a system-based transdisciplinary framework for studying the determinants of sedentary behaviour and to inform policy was developed: the Systems Of Sedentary behaviours (SOS) framework. In total, 550 factors regarding sedentary behaviour were listed across three age groups (i.e., youths, adults and older adults), which during a consensus meeting were reduced to a final list of 190 life course factors. In total, 69 international delegates, seven invited experts and one concept mapping consultant attended the consensus meeting. The framework maps the 190 potential in a system of six interacting clusters: Physical Health and Wellbeing, Social and Cultural Context, Built and Natural Environment, Psychology and Behaviour, Politics and Economics, and Institutional and Home Settings. In addition, priorities were set to focus research on the potentially most modifiable and impactful parts of the system. Investigating the influence of Institutional and Home Settings (including the organisation, physical designs, cultures,

policies of places of dwelling, work, study and care) was deemed to be the most promising area. A manuscript on the SOS framework is published in IJBNPA in 2016.[18]

In 2014, a report was written regarding measures and methods used to assess core determinants of sedentary behaviour across the life course. The report was combined with the chapters from WP2.1, 2.2 and 2.4 into an overall internal report for TA1/TA3 (Deliverable 2.3.1).

Task 2.3.2 Explorative secondary data analysis and development of a framework of the determinants of sedentary behaviour

Within this task and in collaboration with WP2.2 (physical activity), a data pooling taskforce was established to approach dataset owners, retrieve data and to harmonise those data – as described in the report from WP2.2. A number of research questions were formulated to assess the potential for secondary data analyses of the identified datasets. We aimed to add to the current state of knowledge as systematically summarised in WP2.3, and informed by the SOS framework on determinants of sedentary behaviour described above. The formulation of research questions was based on three distinct approaches: 1) clarify linkages of clusters and systems identified in the frameworks, 2) differentiate and nuance correlates of the two behaviours, and 3) begin to fill knowledge gaps in determinant research. An expression of interest statement was requested from DEDIPAC members that were interested in addressing one or more research questions. In addition to a clearly defined research question, the expression of interest included details of the target population, the project hypothesis, target dataset(s), independent and dependent variables, anticipated data harmonisation approach and the foreseen statistical analysis. In addition, a paper was written describing the approach and methods used, and a 'position' paper on the (im)possibilities of pooling and harmonising data on determinants of sedentary behaviour and physical activity. The latter paper advocated the need for a pan-European cohort focusing on determinants of sedentary behaviour and physical activity. A three-day writing retreat was organized in Ghent (Belgium; 16-18th of March, 2016) to work on the different research questions, together with the methods and the position paper.

Deviations from the work plan and failures, if any

There have been a few minor delays and changes in methods as reported in previous annual reports, but none of these have caused any major issues or failures. There have not been further deviations in the last year of the project.

Any other important events that affected on the project

Not applicable

Any other important comment

Not applicable

[18] Chastin SFM, et al. The SOS-framework (Systems of Sedentary behaviours): an international transdisciplinary consensus framework for the study of determinants, research priorities and policy on sedentary behaviour across the life course: a DEDIPAC-study. Int J Behav Nutr Phys Act. 2016;13:83. doi: 10.1186/s12966-016-0409-3

***WP2.4*: Social inequalities in determinants of dietary, physical activity and sedentary behaviours**

Achievements

The *determinants of diet, physical activity/sedentary behaviour among ethnic minority and migrant-origin* network was established based on Expressions of Interest submitted as part of the DEDIPAC proposal. It includes researchers with an interest/expertise in the area of social inequalities in determinants of dietary, physical activity and sedentary behaviours. The network initially consisted of 15 scientist form 7 partners representing a broad range of expertise including: public health nutrition, epidemiology, behavioural and agricultural economics, anthropology and sociology. The network has been led by WP-leaders and task-leaders, and has communicated and delivered outputs through e-mails, monthly teleconferences (14 in total) and 5 live meetings. The minutes were uploaded to the internal DEDIPAC website, Three members of the group were assigned with the task of liaising with the other WPs in TA2 with regards to issues relating to social inequalities (Mario Mazzocchi WP2.1; Lars Langøien WP2.2; Mary Nicolaou WP2.3). The network is described in more detail in the report outlining the organization of a European trans-disciplinary research network on network on determinants of diet, physical activity/sedentary behaviour among ethnic minority and migrant-origin groups in Europe (Deliverable 2.4.2).

Task 2.4.1 Mapping and defining social inequalities in dietary, physical activity and sedentary behaviours, potential explanations, knowledge gaps and key research challenges.

Due to the relatively small number of members in this network and the expertise of the key persons involved, we chose to narrow the focus of the activities relating to task 1 of the project to ethnic minority and migrant origin groups. In addition to the practical considerations, we based our decision to take this approach on the idea that the focus on the three behaviours (diet, physical activity and sedentary behaviour) in reviews and framework development were likely to include literature on social inequalities. In contrast, and from experience, we expected that the body of literature on ethnic minorities and migrants would require more specific search strategies

Consistent with the methodology employed by WP2.2 and 2.3 we used a concept mapping approach with 4 main steps, guided by systems thinking: i. Preparing criteria and protocol; ii. Generating a list of factors influencing dietary and physical activity behaviours in ethnic minority populations living in Europe; iii. Seeking consensus on sorting and structuring factors into emerging clusters based on how they relate to each other; and iv. Interpreting/utilising the framework for research and interventions. Two systematic mapping reviews, one on diet and one on physical activity/sedentary behaviour were performed to generate the set of factors that informed the framework development. Additionally, we sought input from experts for additional factors that might have been missed by the published literature. The latter activities involved brainstorming, and international symposium and expert reviews. In total we have input from 89 participants from 13 academic disciplines. Seven distinct clusters emerged for dietary behaviour (containing 85 factors) and eight for physical activity behaviours (containing 183 factors). Four clusters were similar across behaviours: Social and cultural environment; Social and material resources; Psychosocial; and Migration context. The highest number of factors was identified in the 'Social and cultural environment' clusters for both behaviours (20 factors for diet; 53 factors for physical activity behaviours). The frameworks developed were aligned to those of the other three WPs. We found that similar clusters of factors emerged in the majority population frameworks for diet and physical activity behaviours, except for 'migration context'. The importance of factors across all clusters was acknowledged but their relative

importance, or manifestation differed for ethnic minority versus the majority population. This task has led to two reviews on determinants (one published) and a submitted conceptual paper on the framework (Deliverable 2.4.3).

In 2014, the major determinants have been identified and included in a report on measures and methods used to assess core determinants combined with the chapters from WP2.1, 2.2 and 2.3 into an overall internal report for TA1/TA3 (Deliverable 2.4.1).

Task 2.4.2 Explorative Secondary Data Analysis and Development of Model of the Social Inequalities of Dietary and Physical Activity Behaviours.
Datasets that included ethnic minority and migrant origin populations were sought and included in the inventory as described by WP2.2, and WP2.4 also were involved in the statistical workshop organized across WPs in July 2015. We had planned to make use of the variation between countries in Europe, to identify new candidate explanations for social inequalities in factors driving diet, physical activity and sedentary behaviour, e.g. by comparing the same populations (e.g. specific ethnic minorities) living in different countries through case studies. Ultimately, a very limited number of European cohorts included information on the determinants of diet, physical activity or sedentary behaviour in ethnic minority populations. Thus pooling data was not feasible. We decided therefore to focus our efforts in conducting secondary data analysis on data from individual studies/cohorts. The questions proposed for secondary analyses were developed to address some of the gaps in the literature and also to inform the evolving framework of determinants by "Identifying key potential determinants at different levels" and "Exploring potential mediators and confounders". So far one manuscript titled *"Socioeconomic Indicators Are Independently Associated with Nutrient Intake in French Adults"* has been published. This study found that differences in nutrient intakes are likely to be the combined result of complex effects of different socioeconomic indicators in relation to diet. Educational level appears to be an important driver of nutrient intake in low SEP groups. However the effect of education was, in the case of some nutrients, dependent on income level. One manuscript addresses the role of host environment and acculturation on dietary behaviours is close to being finished and the preliminary results indicate large differences in dietary intake between rural and urban Ghana and three European cities. Acculturation does not seem to explain differences between European locations implying that location is an important driver of dietary behaviour, potentially due to the predominant food environment and lifestyle differences. Two manuscripts address cost of food in ethnic minorities and the impact of the 2008 economic crises on diet of lower income groups, and the last one addresses social inequalities in cooking practices.

Deviations from the work plan and failures, if any
There have been a few minor delays and changes in methods as reported in previous annual reports, but none of these have caused any major issues or failures. Apart from the lack of possibility to pool data on ethnic minorities, there have not been further deviations in the last year of the project.

Any other important events that affected on the project
Not applicable

Any other important comment
Not applicable

Thematic Area 3: Evaluation and benchmarking of public health and policy interventions aimed at improving dietary, physical activity and sedentary behaviours across the life course

General achievements

Based on the information gathered in TA1 and TA2, TA3 had to translate the work done in those TA's into a pan-European toolbox that could then be used in future determinant research work. The overall aim of TA3 was to develop a toolbox for the development, evaluation and implementation of public policies and multicomponent interventions related to dietary behaviour, physical activity and sedentary behaviour. Within our TA, we wanted to improve the quality of public policies and multicomponent interventions by developing a database with good practices. Further, we wanted to improve the implementation (from research to practice/policy) and transferability (from practice/policy to practice/policy) of public policies and multicomponent interventions. We aimed at developing a concept toolbox and at pilot testing this toolbox in different European countries using natural experiments.

The first DEDIPAC-year

The first year mainly consisted of desk and literature research and preparing for the following two years. This resulted in four rapid reviews, two within WP3.1, one within WP3.2 and one within WP3.3. WP3.1 carried out a rapid review on the definition or characteristics of good practice public policies and health promotion interventions, which resulted in reaching consensus on how to define good practice policies and multicomponent interventions. In addition, a second rapid review within WP3.1 was conducted and consisted of critical implementation and transferability conditions for successful implementation. Within WP3.2 and WP3.3, two rapid reviews were conducted. One rapid review was on policy monitoring and evaluation (WP3.2) and the second one was on monitoring and evaluation of multicomponent interventions (WP3.3).

Furthermore, the first draft toolbox was developed within TA3 which included (1) a taxonomy for policies and interventions of crucial determinants of dietary behaviour, physical activity and sedentary behaviour, (2) an overview of implementation conditions, (3) standardized measures to evaluate changes in determinants, behaviours, physical and mental health indicators, (4) a model for economic evaluation, and (5) process evaluation measures.

The second DEDIPAC-year

During the second year, WP3.1 conducted case studies within 5 DEDIPAC countries (Belgium, Germany, Ireland, Norway and Poland) that focused on what health promotion professionals and policy makers believe are important for implementation and transferability. In addition, WP3.1 also developed a database on good practice policies and multicomponent interventions, which had the aim to increase the use and knowledge of good practice in designing and implementing policies and multicomponent interventions.

Furthermore, the toolbox was pilot tested during the second DEDIPAC-year. Partners from WP3.2 and WP3.3 used the toolbox to develop, evaluate and implement their own natural experiment. In this way, additional evidence related to the effectiveness of policies and multicomponent interventions was received. Additionally, information about the usefulness, feasibility and applicability of the draft toolbox was collected.

The third DEDIPAC-year

The third DEDIPAC-year was all about optimizing and finalizing the TA3 toolbox. Within WP3.1, the database on good practices was finalized and added to the toolbox. WP3.1 also provided recommendations on how to improve the concept toolbox. Within WP3.2 and WP3.3, the natural experiments were conducted and evaluated. The information that came out of the natural experiments was also used to finalize the toolbox. There was a consensus meeting (15th of April, 2016 – Amsterdam, the Netherlands) in which all parts of the toolbox were looked at, evaluated and discussed. This has led to a list of possible improvements to the toolbox, which were integrated in the current toolbox.

***WP3.1*: Good practice policies and multi-component interventions for dietary, physical activity and sedentary behaviours including conditions for successful implementation across Europe**

Task 3.1.1

Achievements

1. **Publication of scientific manuscripts**

We performed a rapid literature review to identify good practice characteristics of diet and physical activity interventions and policies. This rapid review is published in BMC Public Health[19].

2. **Good practice database on policies and multicomponent interventions**

We developed a Good practice database containing policies and multicomponent interventions in the field of diet and physical activity. This database contains 44 good practice examples of policies and interventions from 8 different countries. The database contains information on main intervention characteristics (amongst others aim, target population and behaviour), monitoring and evaluation (amongst others outcome and effect, reach and process evaluation) and implementation (sustainability and transferability). Most interventions in the database focus on children and have the school as setting. In addition, most of the interventions are focusing on a combination of diet and physical activity. The database can be found via https://www.dedipac.eu/toolbox/.

3. **Factsheet with information on the Good practice database on policies and multicomponent interventions**

We developed a factsheet that includes information on the good practice database. This factsheet can be used to disseminate the use of the good practice database for policy makers, and health promotion professionals.

Deviations from the work plan and failures, if any

In the work plan, it was described that eleven countries would participate in the inventory of good practices. However, before the start of this WP, Finland decided to withdraw from this WP, leaving ten countries to participate in the WP. We distributed questionnaires to the 10 participating countries, but did not receive information on good practice interventions from Italy and France.

Any other important events that affected on the project

Not applicable

Any other important comment

Not applicable

[19] Horodyska K, et al. Good practice characteristics of diet and physical activity interventions and policies: an umbrella review. BMC Public Health. 2015;15:19. doi: 10.1186/s12889-015-1354-9.

Task 3.1.2

Achievements

1. Publication of scientific manuscript

A SLR has been published in BMC public health[20].

2. Case studies investigating implementation and transferability issues

Case studies have been performed in five DEDIPAC countries (BEL, DEU, IRL, NO, POL). The results are presented in the DEDIPAC Deliverable 3.1.2, and a manuscript has been submitted for publication: Saskia Muellmann, Berit Steenbock, Katrien De Cocker, Marieke De Craemer, Catherine Hayes, Miriam P. O'Shea, Karolina Horodyska, Justyna Bell, Aleksandra Luszczynska, Gun Roos, Lars Jørun Langøien, Gro Rugseth, Laura Terragni, Ilse De Bourdeaudhuij, Johannes Brug, Claudia R. Pischke. Views of policy makers and health promotion professionals on factors facilitating implementation and maintenance of interventions and policies promoting physical activity and healthy eating: results of the DEDIPAC project

Deviations from the work plan and failures, if any

Not applicable

Any other important events that affected on the project

Not applicable

Any other important comment

Not applicable

Task 3.1.3

Achievements

Consensus on the information to be included in the DEDIPAC Knowledge Hub toolbox on a) good practice database on policies and multicomponent interventions and b) implementation was reached at a joint consensus meeting including researchers from WP3.1, 3.2 and 3.3.

Deviations from the work plan and failures, if any

The plan was to organize a consensus meeting with key stakeholders and policy members in the eleven participating countries. However, mainly because of practical and financial reasons it was decided together with the TA3-leader that a consensus will be reached at the joint toolbox consensus meeting organised for WP3.1, 3.2 and 3.3.

Any other important events that affected on the project

Not applicable

Any other important comment

Not applicable

[20] Horodyska K, et al. Implementation conditions for diet and physical activity interventions and policies: an umbrella review. BMC Public Health. 2015;15:1250. doi: 10.1186/s12889-015-2585-5.

***WP3.2*: Development and pilot testing of a toolbox to develop, monitor and evaluate policies related to dietary, physical activity and sedentary behaviour using natural experiments across DEDIPAC member states**

Achievements

The WP achievements were those expected in the program:

1) A "toolbox" for developing, monitoring and evaluating policy interventions related to dietary, physical activity and sedentary behaviour in Europe was developed, evaluated and will be presented in a final version in the meeting in Bonn. The toolbox is now available, in a preliminary version, at the link: https://www.dedipac.eu/toolbox/.

The production of the different parts of toolbox was assigned to various component of TA3. Most part was prepared in spring 2015. The remaining parties, in charge of other members of the group, were completed in February 2016. A preliminary evaluation of the toolbox was realized involving a group of external stakeholders from different countries in summer 2015; at that time some parts of the toolbox were not well defined yet.

The structure of toolbox is articulated in four parts:

- DEVELOPMENT: guiding users through the process of developing a policy or multi-component intervention.
- EVALUATION: in which guidelines and specific instruments to evaluate policies and multi-component interventions are proposed;
- IMPLEMENTATION: guiding the process of implementation and / or process evaluation;
- NATURAL EXPERIMENTS: that show practical examples of policies and multi-component interventions.

2) To verify the functionality of the toolbox and provide practical examples were made at least seven natural experiments, devoted to the evaluation of policies for the promotion of physical activity, proper nutrition or contrast to a sedentary lifestyle, in different countries. Others natural experiments are now available for the final version. The reports illustrating the natural experiments also describe the way in which applicants can use the toolbox.

3) The third phase was a process to verify the consensus on the toolbox. A specific online questionnaire was prepared and proposed at TA3 members. We obtained 25 responses from individuals or groups. The results were presented and discussed in a meeting held in Amsterdam in April 2016. The meeting debate defined changes in different parts of the toolbox. These changes are currently being implemented. As the toolbox is a dynamic product, it will further be developed after the official end of DEDIPAC.

Deviations from the work plan and failures, if any

The planned program was carried out in all its phases. There have been some delays in the preparation of the toolbox.

Any other important events that affected on the project

Not applicable

Any other important comment

Not applicable

***WP3.3*: Development and pilot testing of a toolbox to develop, monitor and evaluate multi-component interventions related to dietary, physical activity and sedentary behaviours using natural experiments across European countries**

Achievements

Organization

The organizational structure of WP3.3 contained regular telephone conferences with all ten partner institutions of WP3.3. Additionally, subtask-specific telephone conferences as well as telephone conferences together with (subtasks of) WP3.1 and 3.2 were held. A division of tasks for the complete DEDIPAC project was set up for all WP3.3 partners and everyone agreed on it. Most tasks of WP3.3 were conducted in close collaboration with WP3.2 as the tasks of the second and third year are joint work of both WPs. In the first year of DEDIPAC, five live meetings in Amsterdam were organized by WP3.3, TA3 and the DMT where partners of WP3.3 participated. During the second year, two live meetings in Paris and Aberdeen (the latter including an economical workshop) were held for TA3. In the third year, the last TA3 meeting was held in Amsterdam for final amendments of the toolbox and a final DEDIPAC meeting of all project members was organized in Bonn.

Toolbox

The first Task 3.3.1 was the development of the concept toolbox for multi-component interventions within the first 12 months. This task contained five subtasks: 1) a rapid review on monitoring and evaluation of multi-component interventions (Deliverable 3.3.1); 2) template for describing multi-component interventions including its content and implementation conditions; 3) inventory of standardized measures to evaluate changes in determinants, behaviours, physical and mental health indicators; 4) measures for the economical evaluation; and 5) process evaluation measures. All developed documents and contents of those subtasks were combined with the results of Task 3.2.1, the development of the concept toolbox for policies. The report (Deliverable 3.3.2) of the draft conceptual toolbox (milestone 3.3.1) was finalized at the end of the first year and combined all merged documents on 356 pages divided in development, evaluation and implementation including several subcategories of multi-component interventions and policies.

At the beginning of 2015, the paper version of the concept toolbox was transferred to an online platform. To improve it, a self-developed feedback sheet containing questions regarding visual appearance, technical features, functionality, content of the toolbox and questions about gaps, remarks and suggestions for improvement was filled out by all partners of WP3.2 and WP3.3 by the end of march 2015 giving grades, providing open answers and additional documents if necessary. For the second feedback round in July 2015, each partner recruited up to four stakeholders in his/her country and let them fill out a slightly adapted feedback format, including information on the stakeholder, usability and user-friendliness of the toolbox, usability for the application for funding, and recommendation to colleagues. The stakeholders participating were e.g. research assistants, PhD students, postdocs, professors, directors, staff members at ministries, programme directors, or health promoters. All partners agreed that the currently used online platform is not the right tool to guarantee user-friendliness and an appealing design, so the adapted toolbox was transferred to the DEDIPAC-homepage in March 2016. Within a last feedback round, all TA3 partners gave feedback as in the previous rounds and the results were shown and discussed at the TA3 consensus meeting in April 2016. Last changes, improvements and recommendations for the current toolbox and future

use were formulated at this meeting. Adaptations were made by the partners who developed the respective part of the toolbox and recommendations were included in the final report (Deliverable 3.3.4). All changes were finally adapted in the toolbox, which is the preliminary tested toolbox (milestone 3.3.2) and can be found on https://www.dedipac.eu/toolbox/.

Natural experiments

Six natural experiments are conducted within WP3.3 in the second and third year, focusing on children, adolescents, children and their parents and their grandparents, and on pregnant women. All partners with a natural experiment (#09, #49, #113, #214, #285, #310) decided which parts of the toolbox they will test and provide feedback on, depending on their study design and PMs. Information sheets about the natural experiments and feedback sheets for the parts of the toolbox were developed, filled in by the partners and combined to a report (Deliverable 3.3.3). The sheets can also be found in the toolbox (https://www.dedipac.eu/toolbox/).

Deviations from the work plan and failures, if any

The report on the rapid review (Deliverable 3.3.1) was delivered in month 8 instead of month 6 due to technical problems with Refworks. The report of the conceptual toolbox (Deliverable 3.3.2.) was finished in month 13 instead of 12 because the merger for all documents and content took slightly more time than assumed. Both delays happened with the approval of the TAL of TA3. Partner #46 from Finland did not receive the grant and therefore is not participating in DEDIPAC anymore.

Some changes were made by partners regarding the natural experiments (Task 3.3.2). As partner #46 from Finland is not participating in DEDIPAC anymore, they will not contribute a study promoting healthy diet in pregnant women as described in the DEDIPAC proposal. Partner #113 from Belgium will aim at the increase of physical activity in 13-year old children with a low intellectual capacity and a low socio-economic status via new media (e.g. smartphone, sms, Facebook). Partner #310 from Germany executed a study with pregnant women which was not specified in the DEDIPAC proposal. Partner #09 from the Netherlands conducted a study on children and not on the elderly population as stated in the DEDIPAC proposal.

Any other important events that affected on the project

Not applicable

Any other important comment

Not applicable

5.Summary and recommendations for maintaining/building upon DEDIPAC

Finally, at the end of our final report we would like to highlight and summarise in a straightforward and concise manner what DEDIPAC was about, what we accomplished, and what we believe would be useful if not necessary steps to build upon the DEDIPAC foundation.

What is DEDIPAC and what was the purpose?

DEDIPAC is the first Joint Action of the JPI HDHL, that aimed at better methodology and insights to understand the 'causes of the causes' of diet, physical activity, and sedentary behaviour in relation to chronic disease, or more formally:

"To understand the determinants, at both the individual and group levels, regarding dietary, physical activity and sedentary behaviours using a broad multidisciplinary approach, and to translate this knowledge into a more effective promotion of these health behaviours."

DEDIPAC included three research themes organised in three so-called Thematic Areas:

1. Towards harmonisation of measurement methods and surveillance
2. Towards better insight in the contextual and individual determinants and their interplay
3. Towards better evaluation and benchmarking of policies and interventions

What did DEDIPAC accomplish?

1. A network of more than 300 European researchers from many different disciplines, all working together towards improving methods and insights regarding the causes of the causes of chronic disease
2. An overview of the quality of measurement methods for diet, physical activity, and sedentary behaviours summarised in an online toolbox
3. Overviews of the scientific state of the art in the determinants of dietary, physical activity and sedentary behaviours
4. A toolbox to assist in the development, implementation and evaluation of interventions and policies
5. The first steps towards cross-European surveillance with a detailed roadmap

What does DEDIPAC recommend as useful and necessary follow-up?

DEDIPAC's research focus is an under-researched area. DEDIPAC thus needs to continue to build upon the infrastructure and collaborations realised to date in our efforts to study, understand and act upon the determinants of dietary, physical activity and sedentary behaviours. There are three tangible ways in which we aim to continue our work:

1. Continue to make use and further strengthen the DEDIPAC consortium
2. Help realise a European cohort of families across all regions of Europe, specifically aimed at investigating the contextual and individual determinants of dietary, physical activity and sedentary behaviours.
3. Applying the DEDIPAC infrastructure for evaluation and benchmarking of policies and interventions to gather evidence on the (cost-) effectiveness in European countries by building upon the 'International Network for Food and Obesity / noncommunicable Diseases Research, Monitoring and Action Support' (INFORMAS) framework'.

Annex A: The DEDIPAC output in numbers

Item	Number	Comments/ further description
Number of publications - All	21 / 71	A total of 71 publication proposals have been submitted to and accepted by the DMT. Of these, 21 publications have been published to date.
Numbers of published publications - Involving 2 or more DEDIPAC Knowledge Hub partners	20 / 21	The remaining publication is a commentary by Johannes Brug and a non-DEDIPAC colleague. Please see Annex B for details.
Number of published publications - Peer review articles	21 / 21	All accepted papers, were published in peer reviewed international scientific journals.
Number of published publications - Other	0 / 21	
Number of presentations given at scientific conferences	> 45	A total of 45 presentations have been presenting DEDIPAC. As these do not include the presentations at DEDIPAC-organized events and include several symposia consisting of multiple presentations, the true number of presentations is much higher. Please see Annex C for details.
Number of communication/ public relation activities/ knowledge exchange events	11	Please see Annex D for details.
Number of consortium meetings	2	1) full-consortium meeting; May 2014; Amsterdam 2) final DEDIPAC symposium; October 2016; Bonn
Number of meetings within TA1/ TA2/ TA3	45	TA1: 15 TA2: 22 TA3: 8
Number of networking events within the DEDIPAC Knowledge Hub	58	
Number of project applications for funding originated from the DEDIPAC Knowledge Hub / Number of successful funding applications	11 / 0	Multiple proposals have been submitted, none were funded to date, but several are still under review.
Number of new collaborations (e.g. other consortia funded under the frame of JPI HDHL, other European consortia funded under H2020 or under another European initiative)	0	Multiple proposals have been submitted, none were funded to date, but several are still under review.
Number of different scientific disciplines involved in the DEDIPAC Knowledge Hub. Please give numbers and list the disciplines	> 16	The 'overarching' disciplines include: Behaviour change, Biology, Clinimetrics, Determinant studies, Ecology, Economy, Epidemiology, Health promotion, Implementation research, Nutrition, Physical activity, Psychology, Public Health, Sedentary behaviour, Sociology, Statistics.
Education and training: academic degrees achieved within the DEDIPAC Knowledge Hub; number of PhD / master theses	6	2 master theses 4 PhD theses
Number of existing databases / cohort studies that have been pooled	69	TA1: 29 TA2: 40 TA3: 0 Please see Annex E for details

Annex B: Publications

A total of 71 publication proposals have been submitted to and accepted by the DMT. Several more are still expected. Of these, 21 papers have been published, 20 of which include two or more partners from the DEDIPAC Knowledge Hub. The table below presents the 20 DEDIPAC publications.

No.	Reference	Partners from DEDIPAC involved as co-author	Impact factor
1	Lakerveld et al. **Towards the integration and development of a cross-European research network and infrastructure: the DEterminants of DIet and Physical ACtivity (DEDIPAC) Knowledge Hub.** International Journal of Behavioral Nutrition and Physical Activity. 2014; 11:143. doi: 10.1186/s12966-014-0143-7 http://www.ijbnpa.org/content/11/1/143/abstract	35 / 35	3.993
2	Chastin S, Schwarz U, Skelton D. **Development of a Consensus Taxonomy of Sedentary Behaviors (SIT): Report of Delphi Round 1.** PLoS One. 2013. doi: 10.1371/journal.pone.0082313. http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0082313	3 / 3	3.540
3	Karolina Horodyska, Aleksandra Luszczynska, Matthijs van den Berg, Marieke Hendriksen, Gun Roos, Ilse De Bourdeaudhuij and Johannes Brug. **Good practice characteristics of diet and physical activity interventions and policies: an umbrella review.** BMC Public Health. 2015; 15:19. doi: 10.1186/s12889-015-1354-9. http://www.biomedcentral.com/1471-2458/15/19	7 / 7	2.209
4	Steene-Johannessen, Jostein; Anderssen, Sigmund A.; van der Ploeg, Hidde P.; Hendriksen, Ingrid J.M.; Donnelly, Alan E.; Brage, Søren; Ekelund, Ulf. **Are Self-Report Measures Able to Define Individuals as Physically Active or Inactive?** Medicine & Science in Sports & Exercise. 2016; 48(2):235-244. doi: 10.1249/MSS.0000000000000760. http://journals.lww.com/acsm-msse/Citation/2016/02000/Are_Self_report_Measures_Able_to_Define.8.aspx	6 / 7	4.041
5	Sebastien F M Chastin, Christoph Buck, Ellen Freiberger, Marie Murphy, Johannes Brug, Greet Cardon, Grainne O'Donoghue, Iris Pigeot, Jean-Michel Oppert and on behalf of the DEDIPAC consortium. **Systematic literature review of determinants of sedentary behaviour in older adults: a DEDIPAC study.** International Journal of Behavioral Nutrition and Physical Activity. 2015; 12:127. doi: 10.1186/s12966-015-0292-3. http://www.ijbnpa.org/content/12/1/127	9 / 9	3.993
6	Annabel S. Stierlin, Sara De Lepeleere, Greet Cardon, Patricia Dargent-Molina, Belinda Hoffmann, Marie H. Murphy, Aileen Kennedy, Grainne O'Donoghue, Sebastien FM Chastin, Marieke De Craemer and on behalf of the DEDIPAC consortium. **A systematic review of determinants of sedentary behaviour in youth: a DEDIPAC-study.** International Journal of Behavioral Nutrition and Physical Activity. 2015; 12:133, doi: 10.1186/s12966-015-0291-4. http://www.ijbnpa.org/content/12/1/133	10 / 10	3.993
7	Karolina Horodyska, Aleksandra Luszczynska, Catherine B. Hayes, Miriam P. O'Shea, Lars J. Langøien, Gun Roos, Matthijs van den Berg, Marieke Hendriksen, Ilse De Bourdeaudhuij and Johannes Brug. **Implementation conditions for diet and physical activity interventions and policies: an umbrella review.** BMC Public Health. 2015; 15:1250. doi: 10.1186/s12889-015-2585-5. http://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-015-2585-5	10 / 10	2.209
8	O'Donoghue G, Perchoux C, Mensah K, Lakerveld J, van der Ploeg H, Bernaards C, Chastin SFM, Simon C, O'Gorman D, Nazare J. A systematic review of correlates of sedentary behaviour in adults aged 18-65 years: a socio-ecological approach. BMC Public Health. 2016; 16:163. doi: 10.1186/s12889-016-2841-3 https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-2841-3	10 / 10	2.209

No.	Reference	Partners from DEDIPAC involved as co-author	Impact factor
9	Stelmach-Mardas M, Kleiser C, Uzhova I, Peñalvo JL, La Torre G, Palys W, Lojko D, Nimptsch K, Suwalska A, Linseisen J, Saulle R, Colamesta V, Boeing H. **Seasonality of food groups and total energy intake: a systematic review and meta-analysis.** Eur J Clin Nutr. 2016; 70(6):700-8. doi: 10.1038/ejcn.2015.224. http://www.nature.com/ejcn/journal/v70/n6/full/ejcn2015224a.html	12 / 13	2.935
10	Loyen A, Van Hecke L, Verloigne M, Hendriksen I, Lakerveld J, Steene-Johannessen J, et al. **Variation in population levels of physical activity in European adults according to cross-European studies: a systematic literature review within DEDIPAC.** Int J Behav Nutr Phys Act. 2016; 13:72. doi:10.1186/s12966-016-0398-2. https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-016-0398-2	14 / 14	3.993
11	Van Hecke L, Loyen A, Verloigne M, van der Ploeg HP, Lakerveld J, Brug J, et al. **Variation in population levels of physical activity in European children and adolescents according to cross-European studies: a systematic literature review within DEDIPAC.** 2016; 13:70. doi:10.1186/s12966-016-0396-4. https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-016-0396-4	11 / 11	3.993
12	Loyen A, Verloigne M, Van Hecke L, Hendriksen I, Lakerveld J, Steene-Johannessen J, et al. **Variation in population levels of sedentary time in European adults according to cross-European studies: a systematic literature review within DEDIPAC.** Int J Behav Nutr Phys Act. 2016; 13:71. doi:10.1186/s12966-016-0397-3. https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-016-0397-3	13 / 13	3.993
13	Verloigne M, Loyen A, Van Hecke L, Lakerveld J, Hendriksen I, De Bourdeaudhuij I, et al. **Variation in population levels of sedentary time in European children and adolescents according to cross-European studies: a systematic literature review within DEDIPAC.** Int J Behav Nutr Phys Act. 2016; 13:69. doi: 10.1186/s12966-016-0395-5. https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-016-0395-5	11 / 11	3.993
14	Chastin SFM, De Craemer M, Lien N, Bernaards C, Buck, Oppert JM, et al. **The SOS-framework (Systems of Sedentary behaviours): an international transdisciplinary consensus framework for the study of determinants, research priorities and policy on sedentary behaviour across the life course: a DEDIPAC-study.** Int J Behav Nutr Phys Act. 2016; 13:83. doi: 10.1186/s12966-016-0409-3. https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-016-0409-3	12 / 13	3.993
15	Osei-Kwasi HA, Nicolaou M, Powell K, Terragni L, Maes L, Stronks K, Lien N, Holdsworth M and on behalf of the DEDIPAC consortium. **Systematic mapping review of the factors influencing dietary behaviour in ethnic minority groups living in Europe: a DEDIPAC study.** Int J Behav Nutr Phys Act. 2016; 13:85. doi: 10.1186/s12966-016-0412-8. https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-016-0412-8	8 / 8	3.993
16	Riordan F, Ryan K, Perry IJ, Schulze MB, Andersen LF, Geelen A, Van't Veer P, Eussen S, van Dongen M, Wijckmans-Duysens N, Harrington JM. **A systematic review of methods to assess intake of sugar-sweetened beverages among healthy European adults and children: a DEDIPAC (DEterminants of DIet and Physical Activity) study.** Public Health Nutr. 2016; 21:1-20. doi: 10.1017/S1368980016002639 https://www.ncbi.nlm.nih.gov/pubmed/27766999	6/11	2.433
17	Riordan F, Ryan K, Perry IJ, Schulze MB, Andersen LF, Geelen A, Van't Veer P, Eussen S, Dagnelie P, Wijckmans-Duysens N, Harrington JM. **A systematic review of methods to assess intake of fruits and vegetables among healthy European adults and children: a DEDIPAC (DEterminants of DIet and Physical Activity) study.** Public Health Nutr. 2016; 14:1-32. doi: 10.1017/S1368980016002366 https://www.ncbi.nlm.nih.gov/pubmed/27624678	6/11	2.433

No.	Reference	Partners from DEDIPAC involved as co-author	Impact factor
18	Si Hassen W, Castetbon K, Cardon P, Enaux C, Nicolaou M, Lien N, Terragni L, Holdsworth M, Stronks K, Hercberg S, Mejean C. **Socioeconomic Indicators Are Independently Associated with Nutrient Intake in French Adults: A DEDIPAC Study.** Nutrients. 2016; 8(3): 158. doi:10.3390/nu8030158 http://www.mdpi.com/2072-6643/8/3/158	7/11	3.759
19	Giancarlo Condello, Fiona Chun Man Ling, Antonino Bianco, Sebastien Chastin, Greet Cardon, Donatella Ciarapica, Daniele Conte, Cristina Cortis, Marieke De Craemer, Andrea Di Blasio, Masar Gjaka, Sylvia Hansen, Michelle Holdsworth, Licia Iacoviello, Pascal Izzicupo, Lina Jaeschke, Liliana Leone, Livia Manoni, Cristina Menescardi, Silvia Migliaccio, Julie-Anne Nazare, Camille Perchoux, Caterina Pesce, Frank Pierik, Tobias Pischon, Angela Polito, Anna Puggina, Alessandra Sannella, Wolfgang Schlicht, Holger Schulz, Chantal Simon, Astrid Steinbrecher, Ciaran MacDonncha, Laura Capranica and on behalf of the DEDIPAC consortium. **Using concept mapping in the development of the EU-PAD framework (EUropean-Physical Activity Determinants across the life course): a DEDIPAC-study.** BMC Public Health. 2016; 16:1145. doi: 10.1186/s12889-016-3800-8. https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-3800-8	34/34	2.209
20	Symmank, C, Mai R; Hoffmann S; Stok M; Renner B; Lien N; Rohm H. **Predictors of food decision making: A systematic interdisciplinary mapping (SIM) review.** Appetite. 2016 (Accepted for publication)	7/7	3.125

Annex C: Presentations

A total of 45 presentations have been presenting DEDIPAC. As these do not include the presentations at DEDIPAC-organized events and include several symposia consisting of multiple presentations, the true number is higher.

No.	Title/topic	Conference
1	The Determinants of diet and physical activity (DEDIPAC) knowledge hub: towards the integration and development of a cross-European research network and infrastructure	ISBNPA 2014
2	The Determinants of diet and physical activity (DEDIPAC) knowledge hub	3rd WCPHN 2014
3	Determinants of sedentary behaviour across the life span: a DEDIPAC symposium	ISBNPA 2015
4	Frameworks to map the determinants of dietary and sedentary behaviour in minority ethnic groups- a DEDIPAC study: potential explanations, knowledge gaps and key research challenges (symposium)	ISBNPA 2015
5	Determinants of Diet and Physical Activity (symposium)	ISBNPA 2015
6	Dietary behaviour: developing a taxonomy of outcomes related to diet, eating and nutrition	ISBNPA 2015
7	Are self-reported measures able to correctly classify individuals according to physical activity recommendations?	ACSM 2015
8	What are good practice characteristics in interventions and policies promoting healthy diet and physical activity?	EHPS 2015
9	Good practices in interventions and policies promoting healthy diet and physical activity: results of DEDIPAC umbrella review	PHPS 2015
10	Development of a methodological framework to assess the conditions necessary for the implementation and transfer of interventions or policies aimed at promoting healthy eating and increasing physical activity – A DEDIPAC study.	GIC 2015
11	A systematic review of determinants of sedentary behaviour in youth: a DEDIPAC study	DGSP 2015
12	JPI HDHL Joint Action: DEDIPAC – Determinants of Diet and Physical Activity Knowledge Hub	FENS 2015
13	Inventory of existing surveillance systems in Europe: a DEDIPAC study	FENS 2015
14	Conditions for the successful implementation and transfer of interventions and policies for the promotion of physical activity and a healthy diet in Europe: Preliminary results of two qualitative case studies conducted in Germany	EPHC 2015
15	The determinants of physical activity: a DEDIPAC systematic literature review	SITI 2015
16	Determinants of Diet and Physical Activity; Knowledge Hub to integrate and develop infrastructure for research across Europe – Experiences and challenges for future KH	JPI HDHL Meeting Malnutrition in the Elderly 2015
17	Determinants of Diet and Physical Activity; Knowledge Hub to integrate and develop infrastructure for research across Europe	8th COSI meeting 2015
18	Implementing interventions and policies targeting health behaviours: Facilitators and barriers	EUPHA 2015
19	Views of policy makers and intervention implementers on factors facilitating the implementation and transferability of interventions and policies for the promotion of physical activity and a healthy diet in Europe	ICBM 2015
20	Good practice characteristics in interventions and policies promoting healthy diet and physical activity	PNHPC 2015
21	Development and relevance of multidisciplinary frameworks of determinants of dietary behaviour, physical activity and sedentary behaviour across the life course and in vulnerable groups – A DEDIPAC Knowledge Hub output	ISBNPA 2016
22	Youth and adult physical activity, sedentary and dietary behaviour surveillance systems and population levels across Europe: a DEDIPAC symposium	ISBNPA 2016
23	Food Decision Making: A Systematic Interdisciplinary Mapping Review	ISBNPA 2016

No.	Title/topic	Conference
24	MAP-IT: a practical tool for planning complex behavior modification interventions	ISBNPA 2016
25	A hierarchy-analysis of socio-demographic correlates of sitting time in European adults	ISBNPA 2016
26	Implementation conditions for diet and physical activity interventions: an umbrella review	ICP 2016
27	Product Characteristics and Consumer´s Food Decision Making: A Network Analysis of the Marketing and Business Literature	EMAC 2016
28	Zufuhr von Energie und Makronährstoffen im Tagesverlauf - eine Auswertung im Rahmen von DEDIPAC	DGE 2016
29	Report of case studies in 5 DEDIPAC member states investigating conditions for successful implementation and transferability	ICBM 2016
30	Association between different sleep characteristics and dietary intake among Bavarian adults	HEC 2016
31	Information on dietary assessment methodology currently used for dietary monitoring in Europe	IARC 2016
32	Critical implementation conditions in interventions and policies for obesity prevention: findings from DEDIPAC KH case study	EHPS 2016
33	Sugar-sweetened beverage intakes from FFQ, telephone- and web-based 24 hour recalls and their associations with demographic and lifestyle characteristics	WEON 2016
34	Umbrella review of current evidence on the policy determinants of PA by pooling the results of SLRs and MAs published between 2004 and 2014	EUPHA 2016
35	Available evidence on the biological, psychological, behavioural, physical, socio-cultural, economic, and policy determinants of PA: seven distinct umbrella SLRs	EUPHA 2016
36	Views of policy makers and stakeholders on factors facilitating sustained policies promoting healthy eating: findings from DEDIPAC case studies in Norway	EPH 2016
37	BMI standard deviation score as a determinant of meal frequency in adolescents: a DEDIPAC study	Obesity days 2016
38	Similarities and Differences in Implementation of School-Based Interventions on Diet and Physical Activity-A DEDIPAC study	EUPHA 2016
39	Conditions for Implementation of Diet and Physical Activity Interventions in Schools-A DEDIPAC study	EPH 2016
40	The role of the LISTANet Consortium in the European DEDIPAC-KH project	SISMES; SIAI 2016
41	The role of the IRILD Consortium in the European DEDIPAC-KH project	SISMES; SIAI 2016
42	The role of the INTREPID Consortium in the European DEDIPAC-KH project	SISMES; SIAI 2016
43	The role of the WISE Consortium in the European DEDIPAC-KH project	SIAI 2016
44	Conditions for Implementation of Diet and Physical Activity Interventions in Schools-A DEDIPAC study	SDIH 2016
45	A systematic review to identify predictors and determinants of SB in youth	CPAS 2017

Annex D: Communication/ public relation activities/ knowledge exchange events

No.	Date	Location	Event
1	6 Dec 2016	Amsterdam, NL	Kick-off meeting DEDIPAC
2	27-28 Feb 2014	Potsdam, GE	DEDIPAC workshop systematic literature reviews
3	14 May 2015	Milano, IT	DEDIPAC workshop at the world EXPO
4	4-6 Jun 2015	Edinburgh, UK	DEDIPAC symposia and presentations at ISBNPA
5	8-9 Jun 2015	Glasgow, UK	DEDIPAC satellite at ISBNPA
6	19 Jun 2015	Brussels, BE	DEDIPAC presentation at JPI HDHL conference
7	1-3 Jul 2015	Amsterdam, NL	DEDIPAC workshop statistical analyses
8	6 Oct 2015	Aberdeen, UK	DEDIPAC workshop economic evaluation
9	14-15 Apr 2016	Bremen, GE	DEDIPAC roadmap – workshop surveillance
10	9-11 Jun 2016	Cape Town, SA	DEDIPAC symposia and presentations at ISBNPA
11	7 Sep 2016	Dublin, IE	DEDIPAC symposium Ireland

Annex E: Existing databases / cohort studies that have been pooled

Thematic Area 1

No.	Project	Databases/ cohort studies
1	Objectively measured prevalence of physical activity and sedentary behaviour among 45,000 young people from at least 18 European countries	European Youth Heart Study (EYHS), International Children Accelerometer Database (ICAD), HELENA, IDEFICS, additional national and international cohorts (e.g. ISCOLE) including at least 400 participants
2	Objectively measured prevalence of physical activity and sedentary behaviour among 9500 adults from five (population-based) studies in four European countries	England: Health Survey for England Norway: Hansen et al. Portugal: Baptista et al. Sweden: ABC study and SNAP study

Thematic Area 2

No.	Project	Databases/ cohort studies
1	Variation in determinant profile for youth who participate in different levels of objectively measured physical activity and sedentary behaviour.	HELENA and EYHS – 30 relevant determinants, objectively measured physical activity, approx. 7000 European adolescents from 14 nations.
2	Relations of physical activity and sedentary behaviours with Mental Health Outcomes and Relevant Biomarkers	TILDA, Mitchelstown, HOORN, CCLAS - 47 relevant variables (physical activity/sedentary behaviour, mental health, depression, anxiety, worry), approx. 18,000 adults, 2 nations.
3	Relations and dependencies between factors/clusters/sub-systems as identified in the Systems of Sedentary behaviour framework	Eurobarometer, Eurostat/Eurapa
4	Relations of physical activity/sedentary behaviour with depression, anxiety, sleep, and potentially relevant biological/genetic markers (from some databases)	Hoorn Prevention Study, CCLaS, TILDA, Cork & Kerry
5	Correlates of physical activity and sedentary behaviour in pre-diabetic adults differences from those identified in healthy adults?	HOORN Prevention study, The New Hoorn Study, Addition Pro Study, DEXLIFE Study
6	What are the gaps in determinants of sedentary behaviour in children? Which determinants are new candidate determinants?	HBSC, ZOOM8, EYHS, ICAD, CCLaS
7	Influences of regional urbanization and economic development in Europe on physical activity and sitting time according to age, gender and socio-economic status	The Special Eurobarometer 183.6 (2002), 246 (2005) and 412 (2013), Regional-level data on population density and GDP from the Eurostat database
8	CHAID – hierarchy in correlates of sitting	Special Eurobarometer
9	Are sleep duration, midpoint of sleep and sleep quality associated with dietary intake among Bavarian adults?	Bavarian Food Consumption Survey II

No.	Project	Databases/ cohort studies
10	DEDIPAC meta-analysis "Sleep duration and beverage intake"	ActivE study Bavarian Food Consumption Survey II European Prospective Investigation into Cancer and Nutrition (EPIC Potsdam) German National Nutrition Survey II GINIplus/LISAplus Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) Mitchelstown Cohort Study
11	Energy and macronutrient intake over the course of the day of German adults: a DEDIPAC-study	German National Nutrition Survey II
12	BMI standard deviation score as a determinant of meal frequency in adolescents - a DEDIPAC study	The Dortmund Nutritional and Anthropometric Longitudinally Designed (DONALD) Study German National Nutrition Survey (NVS) II
13	Dietary Quality During Infancy and Early Childhood in Children With and Without Risk of Type 1 Diabetes	BABYDIET study The Dortmund Nutritional and Anthropometric Longitudinally Designed (DONALD) Study
14	Applying the Dietary Approach to Stop Hypertension score as a measure of dietary quality in children to identify key determinants of dietary quality: A cross country comparison	Cork Children's Lifestyle Study (CCLaS) DOrtmund Nutritional and Anthropometric Longitudinally Designed (DONALD) Postpartum Outcomes in Women with Gestational Diabetes and their Offspring (POGO)

Thematic Area 3

Not applicable