Plan Overview

A Data Management Plan created using DMPonline

Title: The oral health of elite athletes in Ireland

Creator:michael crowe

Contributor: Michael Crowe, Lewis Winning, Lewis Winning

Affiliation: Other

Template: 1. UvH template PhD/WP

Project abstract:

The oral health of elite athletes may be compromised by multiple factors associated with their training regime. This study focuses on assessing the diet and oral health of different disciplines of Irish elite athletes at their training centres. Assessment will include a dental examination and a questionnaire related to lifestyle, oral health related behaviours and impact on training and perfomance. Data entry will use KoboToolbox and athletes will use 24-hour dietary recalls and a FFQ using FoodBook24.

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The oral health of elite athletes in Ireland

1. General features of the project

Please fill in the table the table below.

DMP template version number	1.0 (do not change!)
Project number (if available)	10.5281/zenodo.6821564
Name of Research folder on the UvH R: drive	
Name Chairgroup	Elite Athletes Group
Name Chairgroup leader	Michael O'Sullivan
Research group	Michael O'Sullivan, Lewis Winning, Michael Crowe, Annie Hughes, Jo Saele, Sharon Madigan, Aifric O'Sullivan, Brendan Egan
Name data consultant/data steward	Oscar Cassetti
Check date data consultant/data steward	

2. Data collection and re-use

2.1 In collecting data for my project, I will:

- Generate new data

This study will involve primary data collection by means of an oral examination, questionnaire and 24 hour dietary recall. This will be an observational cross-sectional study investigating the diet and oral health of Irish elite athletes.

2.2 I will be reusing existing data, and I have the owner's permission for that.

- No, I will not be reusing existing data

Results will be reported based on our data collection and analysis.

2.3 In collecting new data, will you be collaborating with other parties such as project partners and/ or suppliers of data.

- Yes, I will collect the new data in conjunction with other researchers or research groups
- Yes, we have established user agreements on the rights of the data

Yes, this is a collaborative study involving dentists, nutritionists, a data scientist and a sports physiologist from different Universities/Institutions:

- Trinity College Dublin / Dublin Dental University Hospital
- University College Dublin
- Dublin City University
- Sports Institute Ireland

2.4 What method(s) do you use for the data collection?

- Survey(s)
- Other
- Individual interviews (semi-)structured

KoBoToolbox and FoodBook24 are Software as a Service (SaaS) tools that can record data offline and provide encrypted transfer to cloud storage on databases using Amazon Web Services (AWS).

Customised oral health survey forms were designed using KoBoToolbox/XLS. Data entry was carried out during clinical examination. Athletes self-completed three 24HR using Foodbook24 to produce a nutrient report.

2.5 Check boxes and describe the tools/software you will use for the data collection.

- software for survey research (e.g. Qualtrics)

KoBoToolbox and FoodBook24 are SaaS tools that can record data offline and provide encrypted transfer to cloud storage on databases using Amazon Web Services (AWS). They are both free, open-source and GDPR compliant.

KoBoToolbox is SaaS built on the Xform/ODK standard that provides field data collection, initial analysis and visualisation. KoBoToolbox was used to create a bespoke supplementary dietary behaviours and lifestyle questionnaire, and a clinical examination record based on a modified WHO oral health assessment.

FoodBook24 is a self-completed dietary assessment application that comprises 24-hour dietary recall (24HR) and a food frequency questionnaire.

2.6 Describe what metadata and documentation will accompany the data?

An excel keycode file will be used to pseudonymise participants assigning a random generator number to de-identify participants throughout the study. This number will be inputed to our online data collection forms and used on the consent form.

We will include a data dictionary as a centralised repository of metadata.

Only one researcher will have access to the password-protected excel file.

3. Data storage

3.1 Will you store your data at the universities network drive?

- No

Data from KoboToolbox and Foodbook24 servers will subsequently be transferred to a password protected .csv file stored on Dublin Dental University Hospital (research server), with access limited to the research team. Once transferred, redundant data on KoboToolbox and FoodBook24 will be deleted. All computers storing data are password-protected. The external hard drive and remotely accessible computer are also encrypted and locked in an office (in the DDUH). Access is restricted to designated staff only.

3.1.a Please indicate:

The reason why data will be stored elsewhere	Data is collected using the web-based tools described above and will be stored on amazon web services until transferred to password protected .csv file.
Where the data will be stored	A password protected .csv file stored on Dublin Dental University Hospital (research server), accessible only by research team
How data security will be guaranteed	Data will be stored securely via cloud-based software amazon web services until transfer to password-protected .csv file. Access will be protected by storing the information on a password protected computer in a locked office.
How long the data will be preserved	Data will be retained for seven years unless a participant wishes to have their data deleted or removed prior to that.

3.3 Do you need to store non-digital data, e.g. on paper? If so, please describe which data, whether the data are personal data and who will have access to the data.

The only non-digital data are the consent forms which are paper-based and pseudonymised with the random identifier from the keycode file. These paper forms will be stored in locked filing cabinet at Dublin Dental University Hospital site. Access will be restricted to investigators only.

3.2 Please fill in the table below about which file types you will have and what the format and volume will be. Think about all information that you will have at the end of the project.

File type	Format	Volume
Keycode file	.csv file, google sheets	MB
Statistical data	R/RDS/Rmd files	MB
Data storage	Database (DB) and Simple Storage Service (S3), AWS	MB

4. Data analysis

4.1 What will be the method by which you will analyse the data?

The diet of elite athletes is associated with an increased risk of dental caries, dental erosion and other oral conditions.
Exploratory data analysis will investigate the 'exposure' of being an elite athlete versus non-elite athlete and also look at differences between different sports disciplines.
Observe the effect of risk factors: dietary factors and lifestlye, training on oral health and performance.
R Markdown/Rstudio files for literate programming and data visualisation.
Exploratory data analysis with emphasis on bayesian approach.

4.2 Which tools will you need to process, analyse or visualise the data?

- Other

R programming language to import, clean, join and aggregate the data from the data surveys.
CSV files for remapping/renaming primary survey data prior to import into RDS files.
Initial simple data visualisation using Kobotoolbox and RStudio.
R Markdown files for literate programming, exploratory data analysis, data visualisation.

5. Participants and Personal data

5.1 Does your research involve human subjects?

- Yes

Yes, research will involve a convenience sample of 100-150 Irish elite athletes.

5.2 Please read the Research Datamanagement Policy outline on this page of the intranet (ENG) or 'Hooflijnen beleid' on this page (NL) of the UvH. Subsequently, check the boxes below.

- I have read the Research Datamanagement Policy outline and will comply to that

This study has received level II ethical approval from the Faculty of Health Sciences in Trinity College Dublin (TCD). The Data Protection Impact Assessment (DPIA) has also been approved by TCD.

5.3 Give a description of the sample participants and whether they are considered as a vulnerable group.

The sample participants will involve Elite Irish athletes. It will include those competing at professional, olympic, or collegiate levels. This group are potentially vulnerable from an oral health perspective.

5.4 Which personal data are you going to collect? Check the boxes and explain why you need them.

- Contact data full (e.g. address, phone number)
- Contact data limited (e.g. name, email)
- Gender
- Age
- Racial or ethnic origin
- Experiences (work, education)
- Other

Email: to give participant access to foodbook24
Eircode: to assess deprivation index
Gender: to compare males vs females
Age: to assess risk of dental disease in different age cohorts
Experiences: to assess socioeconomic status and it's association to dental disease
Ethnicity: to assess risk of dental disease associated with different ethnicities
Other: dental findings

5.5 What legal right do you have to collect the personal data you selected in the question before?

- Informed consent

Informed written consent from each participant for collection of personal data as part of the data collection for the research study.

5.6 Is there, at any time during the research process, a third party handling personal data from your data collection? If so, please give the name of the company, the link to their website and the legal base for processing.

- No

5.7 Describe how you will register participants and how you separate personal data from research data.

Participants will be invited to partake in the study by a gate keeper in Sports Institute Ireland. They will be provided with an invitation letter and participant information leaflet at least 7 days prior to meeting the researchers. They will have contact details to contact the researchers about any queries during this time.
Following a minimum of one week reflection period the gatekeeper will contact potential participants to confirm interest and assign an oral health assessment appointment. Study participants will attend their slot with the investigator. They will have the opportunity to ask any questions prior to signing consent.

6. Information and consent

6.1 Describe how you inform participants and receive their consent to use their personal data.

Participants will be informed via a participant information leaflet and invitation letter. This details the research objections, how their data will be processed and how to contact the research team should they wish.
At least 7 days later, if they have agreed to partake this information will be relayed again, ensuring the participant understands and are willing to be involved. Following this, a written consent form is obtained from each participant.

Participants can contact the researchers at any stage prior to publication to have their data deleted.

6.2 Will participants, parents or guardians receive any reward for participating?

- No

This is made clear on the information leaflet and consent form.

6.3 Will the participants, parents or guardians be debriefed at the end of the data collection session or at the end of the project? Please explain.

- Yes

Participants will be debriefed at the end of the dental exam highlighting any areas of concern. They will be advised if a visit to their dentist is recommended for further investigations.

7. Privacy and Data Security

7.1 When you deal with large scale, systematic data collections of personal data, you need to do a full Data Protection Impact Assessment (DPIA) to fully describe the mitigations and consult the privacy officer of the UvH. Does this apply for your project?

- Yes

A DPIA was completed and approved by the Data Protection Officer (DPO) in Trinity College Dublin.

7.2 How do you take care of the rights of participants? Please copy the table form the example answer and fill in the third column.

Right of participant	Consideration	Describe how you do it
Right of access	When a participant wants to know which personal data you collect, in what way will you manage that?	All of the information collected will be fully disclosed to the participant and the reason why explained. It is described in the information leaflet so that it is known to the participant before they agree to be involved in the study.
Right to rectification	When a participant lets you know that the personal data are not right, how will you manage and how will you let him/her know that it's done	Data will be updated and the participant will be informed as such. In case of contact data we contact the person and we will document what has been changed.
Right to objection	When a participant objects to use his/her personal data, what will you answer and how is this documented?	In the information letter we state that all information that has been collected before the moment of objection, will be kept pseudonymised. The informed consent will also be kept. All personal data in the key file will be destroyed and the person will not be approached any further.
Right to be forgotten	How do you manage deletion of one's personal data upon request?	Data will be deleted on request and not included in the results.
What measures do take to protect the privacy of a person?	How do you make sure that the personal data will not be accessed by unauthorised persons?	It will be stored on password-protected computers that are only accessible by the verified researcher.

8. Data Preservation and Archiving

8.1 What data will be in your data package? Please explain if necessary.

- Documentation of the research process
- Syntaxes, scripts, algorithms
- Description of software
- Several versions of processed data
- Data documentation

Raw data can not be shared under current ethics approval.
All data analysis will be contained within an R Project folder and include a Readme file which will describe all contents.

8.2 In which repository will the data package be archived and made available for re-use, and under which license?

- I will deposit my data package somewhere else and therefore will contact the datamanagement consultant

The data package will be deposited on Zenodo which will develop a DOI creating a persistent link.

8.3 Give the details of the other repository where you will deposit your data.

Name of the repository	Zenodo
Which persistent identifier	DOI
Which metadata standards	
Which information will be publicly shared	preregistration, DMP, analysis, workflow/research process
Which licenses and permissions are in place	CC BY_NC 4.0

8.4 Upon finishing your project you need to hand over the data package to the UvH, so you need to inform yourself in how to do this. Please read the guidance and check the proper box below.

- I have read the paragraph on Archiving in the Research Data Management Policy and will comply to that

9. Data Sharing

9.1 Describe what re-use of your research data you intend or foresee, and what audience will be interested in your data.

At present, there is no plan to re-use the data.

9.2 Are there sharing requirements by third parties? (e.g. funder data sharing policy)? Please explain how you will comply with those requirements.

- No

9.3 Are there any possible restrictions to data sharing or embargo periods?

We will share our data analysis and auxillary documents but raw data cannot be shared due to the University's ethics application.

DOI: 10.5281/zenodo.6821564

9.4 Please state per data type in what way the scientific community will have access to your data.

Data type	Full access	Restricted access	Embargo period	Data immediately linked in the publication	Explanation
metadata	no	no	no	no	not within ethical approval
results	no	yes	no	no	data available on request

10. Costs

10.1 Will you have to hire personnel for the data collection process or any other stage in datamanagement? Please explain and make an estimation.

- No

The 2 primary researchers who perform the dental examinations are undergoing a clinical doctorate in prosthodontics and are carrying out this research as part of their thesis submission. There is no salary associated. However, transport costs will be covered by a research budget each student is allocated while undergoing a clinical doctorate in the Dublin Dental University Hospital.

The Foodbook24 data will be explained and collected by an undergraduate student associated with the Nutrition department in University College Dublin. This will be a paid role to collect and manage the dietary data.

10.2 Will there be costs for data archiving, e.g. when you work with very large datasets, such as audio and video? Please explain and give an estimation.

- No

No, the tools that have been chosen for data collection (FB24 and KBTB) are open source.

Planned Research Outputs

Publication - "Digital data collection protocols and template design for an oral health survey of elite athletes in Ireland"

Aim To design a digital template for form building, data collection and data management to assess the diet and oral health of elite athletes. Subject and methods A web-based open-source platform, KoboToolbox (KBTB), was used to aid design and manufacture of a digital data collection form for use in oral health surveys. KBTB frontend form builder was used to create a customised questionnaire. Dental charting systems for the chosen indices were designed using XLSForms, converted to XForm and uploaded to the KBTB interface to create a single form for digital data input. This template was used to collect data for a cross-sectional study investigating the diet and oral health of a convenience sample of elite athletes in Ireland. Results A digital data collection (DDC) form was designed for use in oral health surveys. The customised form was then used to collect data for a survey of 88 elite athletes on the KBTB platform. Dietary behaviours were recorded by the participants using KBTB. Following data collection, the dataset was downloaded from KBTB and cleaned for subsequent analysis. Conclusion The design of a versatile form and oral health questionnaire template using digital tools customised for elite athletes was useful for efficient, comprehensive field data collection. DDC tools are convenient for data form design, collection, and storage. This template can be easily modified for use by other researchers planning oral health surveys

Publication - "Diet and Dental Caries in Elite Athletes in Ireland"

ABSTRACT Objectives This study assessed dental caries prevalence and dietary habits among elite athletes in Ireland, and analysed dietary intake with particular focus on potentially cariogenic foods and nutrients to determine associations between potentially cariogenic dietary factors and dental caries prevalence using cluster analysis. Methods A cross-sectional study was conducted on a convenience sample of elite athletes. Oral examinations were performed by calibrated examiners using validated indices, including the International Caries Detection and Assessment System (ICDAS) to assess dental caries at both individual and tooth levels. Demographics and lifestyle metrics were recorded using a web-based platform, while dietary information was collected using multiple 24-h dietary recalls (24HR) via FoodBook24. Clustering, profiling of clusters and and binary logistic regression were used to determine if associations exist between dental caries prevalence and potentially cariogenic food groups or nutrients. Results Eighty-eight athletes from seven sports participated, with a mean age of 25.6 years (SD 5.7) and 63% male. The prevalence of untreated dental caries (ICDAS ≥ 3) was 90% at an individual level (presence of caries in any tooth in an individual) and 13% at tooth level (percentage of teeth affected in the population). The mean energy intake was 2678 ± 1352 kcal/day, mean sugar intake was 128 ± 94 g/day and mean starch intake was 169 ± 90 g/day. Cluster analysis identified two distinct groups based on caries prevalence, diet, age, gender, and ethnicity. Binary logistic regression revealed a significant association between cariogenic starch intake from snacks and cluster membership ($p = 0.005$). Conclusions The study found a high prevalence of untreated carious lesions in this cohort, exceeding previously reported levels for elite athletes. Cluster analysis revealed that nutrient consumption patterns, particularly the timing of starch intake, may provide insights beyond those offered by traditional food-group classifications for understanding dietary factors associated with caries risk. These findings underscore the need for prioritising dietary advice and caries prevention strategies in this population, with particular attention on snacking patterns rather than focusing solely on cariogenic food categories.

Planned research output details

Title	DOI	Type	Release date	Access level	Repository(ies)	File size	License	Metadata standard(s)	May contain sensitive data?	May contain PII?
Digital data collection protocols and template des ...	10.1186/s12982-024-00239-1 ...	Publication	2024-09-30	Open	None specified		None specified	None specified	No	No
Diet and Dental Caries in Elite Athletes in Irelan ...	10.1111/jhn.70203 ...	Publication	2026-01-20	Open	None specified		None specified	None specified	No	No