Open Science in Practice

NUTR 230 | FYRE
What do you associate with the word OPEN?
What do you associate with the word CLOSED?
Learning Objectives

Articulate the difference between closed and open science approaches

Define open science

Outline the different stages of the research lifecycle

Identify current open science initiatives

Apply best practices in open science
FYRE Lifecycle
Research Lifecycle

IDEA

METHODS

DATA COLLECTION

ANALYSIS

PUBLICATION
Research Lifecycle

IDEA
- Ask a research question
- Review existing research
- Develop hypothesis

METHODS

DATA COLLECTION

ANALYSIS

PUBLICATION
Research Lifecycle

1. **IDEA**
   - Develop instruments
   - Plan experiments
   - Identify participants and/or subject(s)

2. **METHODS**
3. **DATA COLLECTION**
4. **ANALYSIS**
5. **PUBLICATION**
Research Lifecycle

- IDEA
  - Gather text, numbers, images, etc.
  - Store data
  - Describe data

- METHODS

- DATA COLLECTION

- ANALYSIS

- PUBLICATION
Research Lifecycle

IDEA

METHODS

DATA COLLECTION

PUBLICATION

ANALYSIS

- Build analysis plan
- Use statistics software
- Analyze/transform data
Research Lifecycle

- Present at conference
- Publish in journal
- Share research data
Scientific Research Today
Closed Science
Closed Science
Publication / Poster / Presentation
Why is Closed Science Problematic?

Hides key components of the research process

Makes reproducing or reusing research results difficult

Restricts access to research

Eliminates trust in research

Creates competitive atmosphere where researchers are pitted against one another
Reproducibility Crisis

What is reproducibility?
The ability to follow or implement the same experiments using the same data/tools to get the same results.

Recent studies have found that research results could not be recreated.

Common issues:
- Lack of transparency
- Poor documentation

http://www.nature.com/news/over-half-of-psychology-studies-fail-reproducibility-test-1.18248

http://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-119970
Closed Science
An Example

HEAVENLY PIE

2 ripe bananas
1/2 t. salt
1/2 t. vanilla
1/4 c. chopped nuts

1 c. granulated sugar
2 egg whites
1/2 pint whipped cream

Put in shell, put cream and chopped nuts on top.

MRS. R. D. SICKAFOOSE, Magnolia Grange, Stark County

http://1.bp.blogspot.com/-vHN5EzfAmBA/Vbesj-Aq12I/AAAAAAAACq8/C1bQmrJaKq4/s1600/heavenly%2Bpie.png
The Research Process

Heavenly Pie = Published journal article
Closed Science: Hidden process

IDEA → METHODS → DATA COLLECTION → ANALYSIS → PUBLICATION

Peer review?  Transparency?  Trust?
Publishing articles: **Subscription Model**

Forces the public to pay for research that may have been publicly funded

Increasing expense of these journals make them difficult to access

Limits access to those who can afford to pay
Closed Science: Subscription Model

Published Article

$$$$

[Diagram showing subscription model with access restricted and paid entry]
Closed Science
Transitioning to Open Science
What is Open Science?

Goals:

1. To make the products (e.g., publication, data, methods) of publicly funded research results publicly accessible with no or minimal restriction (OECD, 2015)
2. Foster sharing and collaboration as early as possible in the research process
3. Creating a systemic change to the way science and research is done
Open Science

**IDEA**
- Ask a research question
- Review existing research
- Develop hypothesis

**DATA COLLECTION**
- Develop instruments
- Create experiments
- Identify participants and/or subject(s)
- Gather text, numbers, images, etc.
- Store data
- Describe data

**ANALYSIS**
- Build analysis plan
- Use statistics software
- Analyze/transform data

**PUBLICATION**
- Present at conference
- Publish in journal
- Share research data

**METHODS**
- Analyze/transform data
- Present at conference
- Publish in journal
- Share research data
What are the Benefits of Open Science?

Improves the quality, integrity, and transparency of research

Increases efficiency in research

Research is openly available to all

Stronger engagement with the public

Increases collaboration opportunities = New/faster research
HEAVENLY PIE

2 ripe bananas
½ t. salt
½ t. vanilla
¼ c. chopped nuts

1 c. granulated sugar
2 egg whites
½ pint whipped cream

Put in shell, put cream and chopped nuts on top.

MRS. R. D. SICKAFOOSE, Magnolia Grange, Stark County

http://1.bp.blogspot.com/-vHN5EfAmBA/Vbesj-Aq12I/AAAAAAAACq8/C1bQmrJaKq4/s1600/heavenly%2Bpie.png
The Closed Research Process

Heavenly Pie = Published journal article
An Open Research Process

Heavenly Pie

Clear Instructions (e.g., whip egg whites)

Published journal article

Data, Methods, Resources

HEAVENLY PIE
2 ripe bananas
¼ t. salt
¼ t. vanilla
¼ c. chopped nuts

1 c. granulated sugar
2 egg whites
¾ pint whipped cream

Put in shell, put cream and chopped nuts on top.

MRS. R. D. SICKAPOOSE, Magnolia Groves, Stark County
Open Science: Transparency is key

IDEA ➔ METHODS ➔ DATA COLLECTION ➔ ANALYSIS ➔ PUBLICATION

Clear instructions on how work is done
Opportunity for peer review at any stage
Access to products of research at each stage
Publishing: Open Access

Research publications are available and accessible by anyone

Usually free of copyright so can be reused by others

Are cited more often than subscription-based journals
Open Science: Open Access Model

Published Article

[Diagram showing a flow from a published article to a large group of people]
What does open science look like in action?
**COVID-19 Study Retractions Drive Research Transparency Partnership and Push for Increased Publication of Negative/Null Findings**

The Center for Biomedical Research Transparency, the American Heart Association (AHA) and Wolters Kluwer join forces to launch a new Null Hypothesis collection for the AHA’s scientific journals portfolio.
Montreal Neurological Institute

The Montreal Neurological Institute plans to free up its findings, including data that point to connections between brain regions communicating at different neural rhythms. SÉBASTIEN DERY, MCCONNELL BRAIN IMAGING CENTRE, MONTREAL NEUROLOGICAL INSTITUTE

Montreal institute going ‘open’ to accelerate science

By Brian Owens | Jan. 21, 2016, 2:00 PM

https://www.sciencemag.org/news/2016/01/montreal-institute-going-open-accelerate-science
Canada’s Roadmap

“It will be required that federally-funded research publications, data, and materials be made openly available by January 2023.”

http://science.gc.ca/eic/site/063.nsf/eng/h_97992.html
Where to start with Open Science?
Throughout the research process, ask yourself:

How can I share what I’m doing with others from the very beginning of the process?

Can I hold myself accountable for what I’ve set out to do?

Will others be able to understand what I’m doing/have done?

Will my work be accessible to everyone?
Open Science

**IDEA**
- Ask a research question
- Review existing research
- Develop hypothesis

**METHODS**
- Develop instruments
- Create experiments
- Identify participants and/or subject(s)

**DATA COLLECTION**
- Gather text, numbers, images, etc.
- Store data
- Describe data

**ANALYSIS**
- Build analysis plan
- Use statistics software
- Analyze/transform data

**PUBLICATION**
- Present at conference
- Publish in journal
- Share research data
Open Science in Action

Pre-register your project
Open Science in Action: **Preregistration**

Releasing your research question and study design BEFORE beginning your project

**Benefits:**

- Allows for feedback at the beginning of your project
- Eliminates bias
- Ensures reproducibility of results
- Lets people know research is being done on this topic
Open Science in Action: **Preregistration**

**Example Preregistration Template:**
- Research Question
- Study Description/Justification
- Study Design
- Data Collection Procedures
- Variables being studied (e.g., frequency of caffeine consumption)
Open Science in Action: Pre-registration

Surveying the landscape of CIHR-funded research data sharing practices: An analysis of the published literature

Summary

Provide a narrative summary of what is contained in this registration or how it differs from prior registrations. If this project contains documents for a preregistration, please note that here.

INTRODUCTION: This study will aim to accomplish two specific goals by assessing the availability of health sciences research datasets funded by the Canadian Institutes of Health Research (CIHR). The first goal will be to understand the Canadian data sharing landscape by reviewing how and where Canadian health sciences researchers share their data. The second goal will be to compare Canadian researchers’ current data sharing practices to the Tri-agency’s proposed framework for research data management and sharing. The information gathered from this study will be used to identify gaps within the Canadian data sharing landscape, and help inform the future development of data policy, infrastructure and research data management support by highlighting the key challenges and opportunities with respect to data sharing in a Canadian context.

METHODS: This study will identify all CIHR-funded articles that have indicated whether or not they have shared the research data underlying their published results using PubMed and PubMed Central’s (PMC) dataset search filters. Using PubMed Central, this study will identify CIHR-funded articles that include a data availability statement or include data citations. An additional set of articles will be identified in PubMed using the data filter, which locates articles that directly link to National Institutes of Health-specific or external data repositories. These respective searches will be combined with CIHR-related terms, including both its English and French pronunciation, in the grants information field of both databases. It is anticipated that this search will retrieve close to 5000 articles across both databases.

Contributors
Kevin Read

Description
This study will aim to accomplish two specific goals by assessing the availability of health sciences research datasets funded by the Canadian Institutes of Health Research (CIHR). The first goal will be to understand the Canadian data sharing landscape by reviewing how and where Canadian health sciences researchers share their data. The second goal will be to compare Canadian researchers’ current data sharing practices to the Tri-agency’s proposed framework for research data management and sharing. The information gathered from this study will be used to identify gaps within the Canadian data sharing landscape, and help inform the future development of data policy, infrastructure and research data management support by highlighting the key challenges and opportunities with respect to data sharing in a Canadian context.

Registration type
Open-Ended Registration

Date registered
January 17, 2020

Date created
January 17, 2020

Registered from
osf.io/9w5f

https://osf.io/wjgdb
Checkpoint 1: Uploading your research question

Publicly share your research question and justification before starting your research

Consider:

- Communicating your research question and justification in plain language
- Will be a viewers first exposure to your research
- Always include your names so that you can be credited
Open Science in Action

1. Pre-register your project
2. Share your methods, instruments, etc. when possible
Open Science in Action: **Sharing Methods and Tools**

Sharing the instruments, tools, etc. that you create will allow people to see **HOW** you are conducting your research.

**Benefits:**
- Eliminates bias
- Allows others to potentially use your instruments/tools for their own research
- Opportunity to gain feedback from peers
- Provides an opportunity for you to make your research understandable to others
Open Science in Action: **Sharing Methods and Tools**

**Example:**
- Describing an experiment
- Sharing a questionnaire
- Sharing a survey
- Sharing the software you will use to collect data
Open Science in Action

- Pre-register your project
- Share your methods, instruments, etc. when possible
- Describe your data so it can be understood by others

IDEA

METHODS

DATA COLLECTION

ANALYSIS

PUBLICATION
Open Science in Action: **Make Data Understandable**

Make sure everyone understands and can interpret the data that you collect.

**Benefits:**
- Your data can be understood by others
- Your data can be *reused* by others
- Your data provides a bigger picture of your research project
**Is Your Data Understandable?**

<table>
<thead>
<tr>
<th>p1</th>
<th>p2</th>
<th>p3</th>
<th>p4</th>
<th>p5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>3</td>
<td>Active</td>
<td>Strong</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>3</td>
<td>Inactive</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>2</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>5</td>
<td>Inactive</td>
<td>Weak</td>
</tr>
<tr>
<td>0</td>
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<td>2</td>
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</tr>
</tbody>
</table>
Open Science in Action: Make Data Understandable

Example:
Create a data dictionary of your data

Checkpoint 2: Sharing Survey Questions & Building a Data Dictionary

Survey Q's

4. What is your current position at the University of Saskatchewan?
   - Undergraduate student (Canadian student)
   - Undergraduate student (International student)
   - Graduate student (Canadian student)
   - Graduate student (International student)
   - Post doctoral fellow
   - Faculty/staff member
   - Other (please list)

Raw data
### Checkpoint 2: Building a Data Dictionary

**Template (Available in the Open Science Module on Canvas):**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable Name</td>
<td>Variable Definition</td>
<td>Variable Type</td>
<td>Variable Values</td>
<td>Variable Instructions (if necessary)</td>
</tr>
<tr>
<td>age_years</td>
<td>The age of participants in years</td>
<td>text</td>
<td>N/A</td>
<td>Must enter a number value for age</td>
</tr>
<tr>
<td>Do you take iron supplements?</td>
<td>Assessment of participant's iron intake</td>
<td>multiple choice</td>
<td>0 - No; 1 - Yes; 2 - Don't Know</td>
<td>N/A</td>
</tr>
<tr>
<td>What are your three favourite foods?</td>
<td>Participant's top three selections of their favourite foods</td>
<td>checkbox</td>
<td>1 - Chocolate; 2 - Pizza; 3 - Steak Dinner; 4 - Sour Patch Kids; 5 - other</td>
<td>Other is a free text field and can be entered in manually by participants</td>
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</table>
# Checkpoint 2: Building a Data Dictionary

<table>
<thead>
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<td>Variable Values</td>
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### Checkpoint 2: Building a Data Dictionary

#### FOCUS ON UNDERSTANDABILITY/TRANSPARENCY!

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<td>foods?</td>
<td>foods</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Open Science in Action

IDEA

PRE-REGISTER YOUR PROJECT

METHODS

SHARE YOUR METHODS, INSTRUMENTS, ETC. WHEN POSSIBLE

DATA COLLECTION

DESCRIBE YOUR DATA SO IT CAN BE UNDERSTOOD BY OTHERS

ANALYSIS

BE TRANSPARENT ABOUT AND SHARE YOUR DATA ANALYSIS PLAN

PUBLICATION
Open Science in Action: **Build an analysis plan**

Provide a description of how you will explore your data after it has been collected.

**Benefits:**

- Holds you accountable to how you will analyze your data
- Eliminates the risk of manipulation of data
- Provides clear instructions to a user about how you transformed your data
Open Science in Action: **Build an analysis plan**

**ANALYSIS**

Examples:

- “I created pivot tables using the height and weight variables”
- “We averaged the caffeine consumption of adults between the ages of 20 and 25”
- “We examined how frequently male and female students eat breakfast by looking at the `gender` and `student_bkfst` variables”
What is included in a data analysis plan?

A summary of what the document is about

A description of every data analysis procedure you complete, including:

- The type of analysis (e.g., average, mean, count)
- The variables you analyzed and the value you are exploring (e.g., gender = female, coffee consumption = 5 times a day)
- Any figures or summary results that you found

Reference/link to your survey and/or data dictionary for more context
Example: My own research

Analysis 1: Counting Data Sharing Methods
Using the data collection instrument: *CIHR-funded Data Sharing Instrument*, we counted (using COUNT= function in Microsoft Excel) the methods of data sharing.

Variables used:
- Is data available? = 1
- Is data accessible? = 1
- Was data sharing not possible? = 1
- Was there no evidence of data sharing? = 1

Related documents:
- [CIHR-funded Data Sharing Instrument](#)
- [Data Dictionary](#)

Generated figure:
Example: My own research continued...

**Analysis 1: Counting Data Sharing Methods**
Using the data collection instrument titled: CIHR-funded Data Sharing Instrument, we counted the different methods of data sharing.

**Variables used:**
- Is data available? = 1
- Is data accessible? = 1
- Was data sharing not possible? = 1
- Was there no evidence of data sharing? = 1

**Related documents:**
- CIHR-funded Data Sharing Instrument
- Data Dictionary

**Analysis 2: Averaging CIHR-funded Data Accessibility**
We averaged the total number of times a researcher with CIHR-funded made their research data accessible to the public.

**Variables used:**
- Grant agency = 1 and Is data accessible? = 1

**Related documents:**
- CIHR-funded Data Sharing Instrument
- Data Dictionary
Example: My own research continued...

Analysis 1: Counting Data Sharing Methods
Using the data collection instrument titled: CIHR-funded Data Sharing Instrument, we counted the different methods of data sharing.

Variables used:
- Is data available? = 1
- Is data accessible? = 1
- Was data sharing not possible? = 1
- Was there no evidence of data sharing? = 1

Related documents:
- CIHR-funded Data Sharing Instrument
- Data Dictionary

Analysis 2: Averaging CIHR-funded Data Accessibility
We averaged the total number of times a researcher with CIHR-funded made their research data accessible to the public.

Variables used:
- Grant agency = 1 and Is data accessible? = 1

Related documents:
- CIHR-funded Data Sharing Instrument
- Data Dictionary

Repeat for each new analysis
Open Science **in Action**

- **Idea:** Pre-register your project
- **Methods:** Share your methods, instruments, etc. when possible
- **Data Collection:** Describe your data so it can be understood by others
- **Analysis:** Be transparent about and share your data analysis plan
- **Publication:** Share the publication, data, and tools created
Open Science in Action: **Share your research**

Share all products of research including your final paper, data (when possible), conference presentation, poster, software, etc.

**Benefits:**
- Others can see the full breadth of your research
- Your research will be reproducible
- Your research will be accessible to everyone
Open Science in Action: **Share your research**

**Examples:**

- Journal article
- Data, Methods, Tools
- Open Access Journal
- Public Repository
Open Science Framework (OSF)

Welcome to the NYU Health Sciences Library's Data Catalog project. Our aim is to encourage the sharing and reuse of research data among institutions and individuals by providing a simple yet powerful search platform to expose existing datasets to the researchers who can use it. There is a basic backend interface for administrators to manage the metadata which describes these datasets.

Read More

Citation

Components

- Metadata & Cataloging Documentation
  - Read, Surkis, Larson & 3 more

- Code
  - Read, Surkis, Larson & 3 more

Tags

- biomedical research
- data catalog
- data discovery
- data documentation
- data model
- data reuse
- data set
- datasets
- data sharing
- GitHub
- metadata
- research data
- searching

Recent Activity

- Nicole Contaxis made NYU Data Catalog public
  - 2017-07-12 09:50 AM

- Nicole Contaxis made NYU Data Catalog private
  - 2017-07-12 08:27 AM

- Kevin Read reordered contributors for NYU Data Catalog
  - 2017-05-07 07:34 AM

- Nicole Contaxis made NYU Data Catalog public
  - 2017-06-27 11:27 AM

- Nicole Contaxis made NYU Data Catalog private

https://osf.io/
Exercise: Create an OSF Account

The place to share your research

OSF is a free, open platform to support your research and enable collaboration.

Get started

Discover public research

Discover projects, data, materials, and collaborators on OSF that might be helpful to your own research.

https://osf.io/
Open Science Framework Panopto Videos

https://usask.cloud.panopto.eu/Panopto/Pages/Sessions/List.aspx?folderID=655bd58f-9927-4ad0-a414-ac2a0106df48
**Open Science in Action: My Own Research**

### Preregistration

Surveying the landscape of CIHR-funded research data sharing practices: An analysis of the published literature

<table>
<thead>
<tr>
<th>Contributors</th>
<th>Kevin Reid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>This study aimed to accomplish two specific goals by assessing the availability of health sciences research datasets funded by the Canadian Institutes of Health Research (CIHR). The first goal was to understand the Canadian data sharing landscape by reviewing how and where Canadian health sciences researchers share their data. The second goal was to compare Canadian researchers' current data sharing practices to the Tri-Agency's proposed framework for research data management and sharing. The information gathered from this study will be used to identify gaps within the Canadian data sharing landscape, and help inform the future development of data sharing policies and research data management support by highlighting the key challenges and opportunities for data sharing in a Canadian context.</td>
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**IDEA**

<table>
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<th>Registration Type</th>
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<tr>
<td>Date registered</td>
<td>January 17, 2020</td>
</tr>
<tr>
<td>Date created</td>
<td>January 17, 2020</td>
</tr>
<tr>
<td>Registered from</td>
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**METHODS**

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<th>Files</th>
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<th>Analytics</th>
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</thead>
<tbody>
<tr>
<td>Citation</td>
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</table>

**DATA COLLECTION**

<table>
<thead>
<tr>
<th>Name</th>
<th>Surveying the landscape of CIHR-funded research data sharing practices: An analysis of the published literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>Project</td>
</tr>
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</table>

**PUBLICATION**

<table>
<thead>
<tr>
<th>Help</th>
<th>Donate</th>
<th>Join</th>
<th>Login</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</table>

**Research Products Available Online**

[https://osf.io/n9jv5/](https://osf.io/n9jv5/)

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*Note: The images depict the workflow of a research project with steps labeled as Idea, Methods, Data Collection, Analysis, and Publication.*
Open Science in Action: Getting Credit

Research Products Available Online

Surveying the landscape of CIHR-funded research data sharing practices: An analysis of the published literature

Contributors: Kevin Read, Heather Ganshorn, Sarah Rutley, David R. Scott
Date created: 2020-01-17 03:01 PM | Last Updated: 2020-05-27 11:59 AM
Category: Project
Description: This study will aim to accomplish two specific goals by assessing the availability of health sciences research datasets funded by the Canadian Institutes of Health Research (CIHR). The first goal will be to understand the Canadian data sharing landscape by reviewing how and where Canadian health sciences researchers share their data. The second goal will be to compare Canadian researchers’ current data sharing practices to the Tri-agency’s proposed framework for research data management and sharing. The information gathered from this study will be used to identify gaps within the Canadian data sharing landscape, and help inform the future development of data policy, infrastructure and research data management support by highlighting the key challenges and opportunities with respect to data sharing in a Canadian context.

Citation

APA

MLA

Chicago

Get more citations
Enter citation style (e.g. “APA”)
Open Science: Transparent process

IDEA → METHODS → DATA COLLECTION → ANALYSIS → PUBLICATION
Open Science: Transparent process

IDEA → METHODS → DATA COLLECTION → ANALYSIS → PUBLICATION

Preregister study
Share methods, instruments, tools
Open Science: Transparent process

IDEA → METHODS → DATA COLLECTION → ANALYSIS → PUBLICATION

Create data dictionary
Open Science: Transparent process

IDEA → METHODS → DATA COLLECTION → ANALYSIS → PUBLICATION

- Describe data analysis
- Share data analysis plan
Open Science: Transparent process

IDEA → METHODS → DATA COLLECTION → ANALYSIS → PUBLICATION

Share poster
Share data
Open Science: Transparent **ONGOING** process
Open Science: Provides access to new material

IDEA
- Preregister study
- Share methods, instruments, tools

METHODS
- Create data dictionary

DATA COLLECTION
- Describe data analysis
- Share data analysis plan

ANALYSIS
- Share data

PUBLICATION
- Share poster
Open Science in NUTR 230
## Open Science Checkpoints

<table>
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<tr>
<th>Checkpoint</th>
<th>Open Science Component</th>
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<tr>
<td><strong>Checkpoint 1:</strong> Submission of Research Question and Justification</td>
<td>Students create a collaborative OSF project and upload the finalized research question and justification. Share the link on the project pages of Canvas. <strong>Due: Sept 21</strong></td>
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<tr>
<td><strong>Checkpoint 2:</strong> Submission of Survey Questions</td>
<td>Student create a data dictionary of their survey questions and upload to their OSF project. <strong>Due: Oct 7</strong></td>
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<td><strong>Checkpoint 3:</strong> Submission of Draft Introduction &amp; Methods Section of Poster</td>
<td>Students upload their introduction and methods to their OSF project. <strong>Due: Nov 5</strong></td>
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<tr>
<td><strong>Checkpoint 4:</strong> Data Analysis Progress and Draft Poster</td>
<td>Students write a summary of the analysis procedures they have applied to the data and upload it to their OSF project. <strong>Due: Nov 25</strong></td>
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<tr>
<td><strong>Final product:</strong> Completed poster</td>
<td>Students upload their completed poster to their OSF project and cite their OSF project in their poster. <strong>Due: Nov 30</strong></td>
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Open Science Checkpoints: File Naming

Before uploading documents to the Open Science Framework, use this file naming convention for clarity:

```
projectname_documenttype_YYYYMMDD[date]
```

Examples:

- studentexerciselevels_datadictionary_20200901
- caffeineconsumption_researchquestion_20201029
- plantbaseddiets_introandmethods_20200812
Summary

Consider the value of making your research openly available

Continually ask yourself whether your project would be understandable to someone unfamiliar with your work

Complete the checkpoints with the idea that your research could be viewed by anyone

Open science practices can improve the quality and transparency of research for the better!
Resources

FYRE-specific Open Science Framework Training Videos:
https://usask.cloud.panopto.eu/Panopto/Pages/Sessions/List.aspx?folderID=655bd58f-9927-4ad0-a414-ac2a0106df48

How to Make a Data Dictionary:

What is Open Science? https://www.fosteropenscience.eu/node/2269

Canvas Modules

- First Year Research Experience (FYRE) Resources and Activities
  - Open Science Resources
    - Open Science Framework Team Projects Page
    - Open Science Lecture Slides
    - Open Science Framework Tutorials
    - Open Science File Naming Guidance
    - Data Dictionary Template
    - How to Make a Data Dictionary Guide
    - Data Analysis Plan Template
References


Questions?
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(or ask in the Canvas FYRE Lounge)