



HEALTH SCIENCES  
RESEARCH UNIT  
NURSING

UNIDADE DE INVESTIGAÇÃO  
EM CIÊNCIAS DA SAÚDE  
ENFERMAGEM



Escola Superior de  
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## HEALTH SCIENCES RESEARCH UNIT: NURSING

### RESEARCH DATA MANAGEMENT

ESEnFC

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Complex global challenges require science to be more transparent and accessible. Open science has emerged as a response to this need.

Open science can be defined as a set of principles and practices that aim to make scientific research from all fields accessible to everyone for the benefit of the scientific community and society as a whole (UNESCO, 2021, 2022). Open science promotes not only access to scientific knowledge, but it also makes the scientific process more transparent, inclusive, and democratic, reinforcing scientific social responsibility (Ministério da Ciência, Tecnologia e Ensino Superior, 2016; UNESCO, 2021).

The UNESCO Recommendation on Open Science was adopted by 193 countries in 2021. It outlined the first common definition of open science and provided a set of values, principles, standards, and actions to support open science practices at individual, institutional, national, regional, and international levels (UNESCO, 2021).

The core values of open science are: Quality and integrity; Collective benefit; Equity and fairness; and Diversity and inclusiveness. The guiding principles for open science are: Transparency, scrutiny, critique and reproducibility; Equality of opportunities; Responsibility, respect and accountability; Collaboration, participation and inclusion; Flexibility; and Sustainability (UNESCO, 2021). When planning their research projects, researchers should integrate these values and principles with a view to adopting best practices in the field of open science.

Open scientific knowledge is a key component of open science, which includes open access to scientific publications, research data, and metadata.

Both nationally and internationally, research data management and sharing policies have been defined, and the major science funding agencies, namely the Foundation for Science and Technology (FCT) or the European Union's Research and Innovation Framework Program, Horizon Europe, currently require compliance with these requirements at the various stages of the research data lifecycle.

### **Data Management Plan (DMP)**

One of the current requirements of funding agencies is the creation of a **Data Management Plan (DMP)**. A DMP is a living document, which should be updated

whenever necessary, that describes how data will be managed throughout a research project. It should include information on data collection and reuse, metadata, as well as processing, storage, security, sharing, and long-term preservation, among others (FCCN, 2022).

Funding agencies, such as [FCT](#) or the [Horizon Europe](#) framework program, provide templates and guidelines to create a DMP. There are several online tools to help create DMPs, such as ARGOS, from the OpenAIRE project, and DMPOnline, where researchers can choose templates adapted to the requirements of each funding agency and adjust them to the specific needs of each project. At a national level, Portugal's Open Access Scientific Repository (RCAAP) has produced a technical report on tools for creating DMPs (Príncipe et al., 2020).

### **FAIR Principles**

When managing research data from their projects, researchers should also ensure compliance with the FAIR Principles so that data are findable, accessible, interoperable, and reusable. These principles were published in 2016 as guidelines of good research data management and stewardship practices for those who publish and/or preserve research data (Wilkinson et al., 2016). These principles apply not only to the data, but also to the other components of the research process, such as the algorithms, tools, and processes that led to that data to ensure transparency, reproducibility, and reusability of knowledge (Wilkinson et al., 2016).

#### **Principle of “As open as possible, as closed as necessary”**

In line with good research data management practices, researchers should also consider the principle of “**As open as possible, as closed as necessary**”. In the spirit of open science, researchers should adopt strategies, such as anonymization, that allow as much data as possible to be shared, while paying particular attention to sensitive data (<https://www.openaire.eu/sensitive-data-guide>). However, there are exceptions where it may be necessary to restrict access to data, for example to protect human rights, confidentiality, intellectual property rights, and other aspects (UNESCO, 2021).

### **Deposit in a Research Data Repository**

Researchers should deposit their research data in a trusted **research data repository**, such as Zenodo. Trustworthy repositories include those that are registered in the [re3data](#)

registry, aggregated on OpenAIRE, or have an indication of trustworthiness (such as [CoreTrustSeal](#), [Nestor Seal](#) or [ISO16363](#); OpenAIRE, n.d.-a). At national level, FCT's National Scientific Computing Unit (FCCN) is working on the [Polen Repository](#) to promote the sharing of publicly funded research data among the national scientific community.

### **Measures that ensure reproducibility**

Researchers should also adopt **measures to ensure the reproducibility of the results of funded research**. Thus, along with the research data, information on other results, tools, and instruments required for the reuse and validation of the data should also be made available in the repository (OpenAIRE, n.d.-b).

### **Persistent identifiers and licenses**

Researchers should use **persistent identifiers and standard licenses** for their research results. The use of persistent identifiers such as the Digital Object Identifier is a good research data management practice to ensure the findability of data, metadata, and results, as they are unique references to these digital objects (European Commission, 2024).

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## GLOSSARY

### Research data

Quantitative information or qualitative statements collected by researchers in the course of their work by experimentation, observation, modelling, interview, or other methods.

Data may be “raw” or primary (e.g., direct from measurement or collection) or derived from primary data for subsequent analysis or interpretation (e.g., cleaned-up data or as an extraction from a larger dataset), or derived from existing sources where the rights may be held by others.

### Research data management

It describes the organization, storage, preservation, and sharing of data collected and

used in a research project. It involves the everyday management of research data during the lifetime of a research project. It also involves decisions about how data will be preserved and shared after the project is completed (e.g., depositing the data in a repository for long-term archiving and access).

### **Metadata**

Information that describes significant aspects of a dataset. For example, this may include authors, title, date of publication, unique identifier, a description of what the dataset contains, and a license. This provides other researchers with the information needed to understand and reuse the dataset as well as making the dataset more accessible and findable.

### **Data Management Plan (DMP)**

A document that describes how the research data will be managed throughout the research lifecycle. This plan covers several areas, including a strategy for the collection, backup and storage of data, ethical and legal requirements related to data, data sharing, and data archiving.

### **FAIR Principles**

A set of guiding principles to ensure that data are findable, accessible, interoperable, and reusable. [FORCE11](#) is the organization that defined these principles and provided an explanation of their exact meaning and implementation.

### **Data repository**

Platforms that can aggregate, store, preserve, and manage research datasets. Depositing data in repositories increases their visibility and the opportunities for collaboration within the scientific community. The storage, preservation, and accessibility of research data can contribute to the reproducibility, dissemination, and validation of science.