APPRAISALS IN META-JOURNAL HOUR 17

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The paper: Exploring Factors That Influence the Practice of Open Science by Early Career Health Researchers: A Mixed Methods Study [1].

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Why was this study conducted?

Open Science is a term which encompasses several areas, such as open access, open data, open source and open reproducible research, all of which encourages transparency and collaboration among stakeholders in the research process. This transparency is important to avoid unnecessary duplication of research and thus maximize research efficiency. It is especially important for health research in order to ensure the best possible outcomes for patient care and health service delivery. Despite this, awareness and engagement in open science activities remains suboptimal, particularly among early career researchers (ECRs). ECR had less knowledge than senior researchers, and they are often heavily involved in research data collection and analyses but have less autonomy for research decision-making. Hence, this study aimed to:

i. To explore the perceptions and experiences of open science for ECRs working in health research.
ii. To explore the barriers, facilitators and factors influencing their practice of open science activities.

How was it done?

Ethical approval and study protocol

This study was approved by the NUI Galway Research Ethics Committee. The study protocol is accessible at [2]. This study is reported as per Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist.

Study sample and setting

Study participants were a convenience sample recruited from a two-day introductory training workshop on open science, which was held in NUI Galway (Republic of Ireland) in April 2019 for ECR. Participants self-defined themselves as ECRs when registering for the event, with no restrictions placed on eligibility.

Study design

A convergent mixed method design was used to address the research question of the study. Using this method, both qualitative and quantitative data will be collected and analysed separately before being interpreted. In this study, participants were provided with quantitative data via questionnaires and they were subsequently followed up with individual semi-structured qualitative interviews.

Quantitative data collection

Participants were required to complete study questionnaire before and after the workshop. Before the workshop, data on participant demographics such as gender, age and work discipline were collected. In terms of the contents, both pre- and post- workshop questionnaires:

- Explore the knowledge and awareness of open science components
- Explore the initiatives among ECR
- Explore the perceptions of the barriers and facilitators influencing their practice of open science activities

Qualitative data collection

- Collected in-telephone or face-to-face by preference
- Duration of 13 to 34 minutes with an average of 21 minutes
- Conducted within three weeks after workshop
- Interviews were audio-recorded and transcribed verbatim
- Member checking of transcripts was not conducted due to time

The topic guide for qualitative data collection were developed by an experienced qualitative researcher (CH) with input from members from the research team to structure the interviews.

Explored participants' understanding and experience with open science

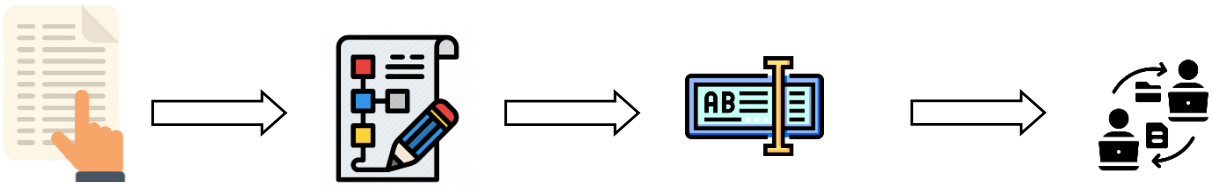
Perceptions of barriers and enablers to practicing open science, with specific probes to enable deeper exploration of the topic in question

The interview topic guide can be obtained from Appendix 1.

Data analysis

Quantitative data analysis was conducted using Microsoft Office Excel involving basic descriptive statistical analysis including percentage distribution and median calculations. On the other hand, qualitative data was analysed using thematic analysis utilizing NVivo 12 software. The analysis were divided into two phases, namely Phase 1 and Phase 2.

FIRST PHASE



- Interview transcripts were read by 1 research member
- Coded statement into nodes which is named according to the content of the statements
- The coding was an iterative process which involving re-naming the node to give a better idea of its content
- The NVivo file was sent to a second researcher (CH) to review the nodes

SECOND PHASE

NVivo file was sent to second researcher to review the nodes

Initial themes were then generated and refined by the two researchers through iterative cycles of discussion and review

The final themes, subthemes and their descriptions were then reviewed by a third researcher alongside the transcripts aka 'critical friend'

Rigour

A number of strategies were employed to ensure the study was carried out in a rigorous and transparent way such as:

1. Peer researcher to review and assess transcripts, emerging and final categories from those transcripts and the final themes or findings.
2. Creation of a codebook within QSR NVivo to demonstrate the dependability of the findings. (Appendix 4: Codebook)
3. Coding query function to illustrate the density of coded references from each participant across all subthemes in order to emphasis the findings were grounded data (Appendix 5: Coding density).

What were the findings?

Participant characteristics

Data on participant demographics are described in Table 1. Out of 14 participants:

- Four participants had obtained a PhD in the previous 1 – 2 years
- One was 6 years post PhD, seven were undertaking a PhD at the time of participating in the study.
- Two did not have a PhD

Survey findings

Survey data identified that participants reported better knowledge of open science components like open access and open peer review than of components such as open data, open source, open notebooks, open education and citizen science. In addition, more than half of the participants expressed their concerns over personal data breach and the lack of standard operational procedures (SOP) for data sharing guidelines by respective institutions. Besides that, open science activities should be recognised to enhance career progression.

Further details of post-workshop survey findings are available in Extended data: Appendix 6 [2].

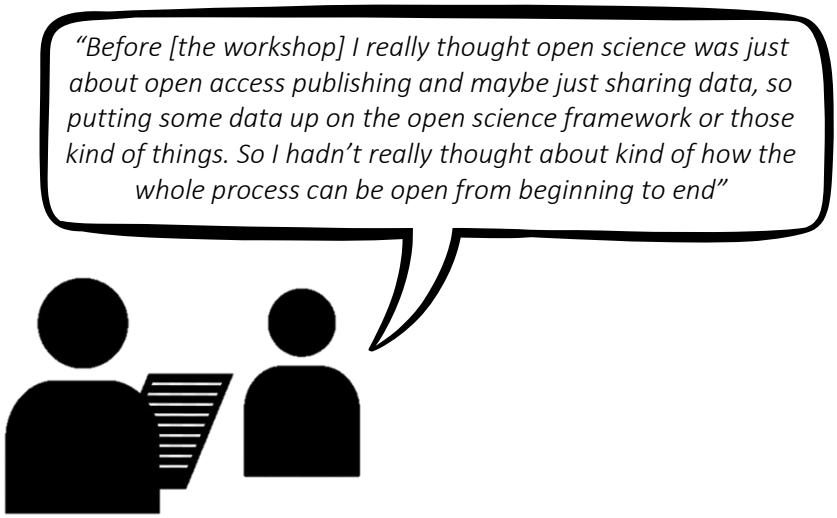
Thematic analysis

A 'wordcloud' was created using QSR NVivo queries to illustrate most commonly used words when participants talked about open science.

THEME 1: VALUING OPEN SCIENCE

Subtheme 1: The 'what' of open science

Participants perceived open science as a broad umbrella term, encapsulating 'openness' across the entire research cycle, from before a study starts (for example, using pre-registration and open notebooks) until after it finishes (for example, with open access publishing and data sharing).



Subtheme 2: The 'why' of open science

Participants perceived open science to be important because it leads to better research which leads to better overall impact of research for patients and public. For example, practices such as protocol publication may facilitate timely and accessible sharing of researchers' plans, further allowing others to review and identify potential errors early in the research process.

THEME 2: CREATING A CULTURE FOR OPEN SCIENCE

Subtheme 1: Cultural and academic pressure

Despite being early career researchers, participants expressed pressure in terms of time constraints and the needs to publish their work as academics. As a consequence, incorporating activities related to open science can be challenging to their already hectic schedules. Besides, there were also reluctance to embrace change in research practice towards supporting open science especially among senior colleagues pertaining to their familiarity in a well-established and traditional research activities.

Subtheme 2: Increased accountability and the challenges of transparency

The increased accountability was discussed as one of the crucial factors influencing ECR's engagement with open science activities, serving as both a barrier and a facilitator. The transparency in open science was acknowledged but raised concerned including feeling exposed and vulnerable to criticisms. The participants also had concerns about potential mistakes being identified by others.

1

"Well I think the flip side of it is the timing to engage and find and network, as well, with others about open science on a day to day running of and teaching and administrating and writing and trying to engage in research. We have all got so many hats on us that unless you know there's a little bit more protected time for I suppose advancing ourselves and our own knowledge in certain areas."

"So I think in terms of challenges around knowledge and training I believe that they would also be challenges if not more so a challenge for more senior career researchers. So I think that's definitely similar as well. Publications, impact factor, I don't think things like that slow down as you become more senior…I think challenges are similar and probably all at the same level of knowledge I'd say as well and expertise and experience in doing this."

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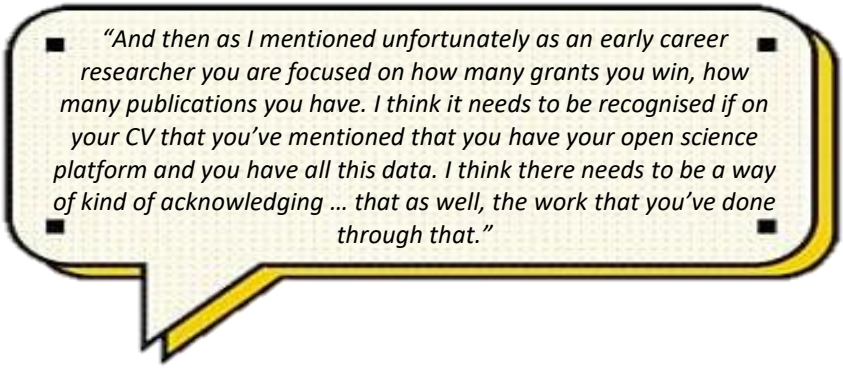
Besides that, there were participants identified fear of data being misused and risk of having research ideas being stolen as potential barriers in practicing open science.

"And I know that's something that you shouldn't really be scared of because you know we're all just kind of working and doing our best. But that would definitely be something that would be in the back of my mind if I was putting up my data that someone would rerun it and say you did this all wrong."

"I think it probably creates efficiencies in the system because if you're the named reviewer you probably would respond quicker. And if you know your information's up there, you're probably more likely to be pleasant at least and courteous with your colleagues. And at least you can see conflicts of interest more clearly as well."

Subtheme 3: Striving to be open

All interviewees stressed the significance and necessity of additional training and resources to support both early-career researchers (ECRs) and all researchers. They emphasized the importance of integrating such support into existing systems and having it driven from the top, exemplified by institutional buy-in.



How much can we learn from this paper?

The concept of an 'open science culture' holds significant importance within this study. Specifically, the current academic culture and the absence of career incentives to practice open science are critical factors influencing the behaviours of ECR. The lack of incentives has been previously identified as a major challenge to open science for ECRs [3], in which the existing reward system as detrimental to open science behaviours among ECRs [4].

As stated by the participants in the study, practices or systems that reward open science behaviours are rare, and involvement in open science is often not formally acknowledged, sometimes even discouraged. While the availability of funding, training, education events, and resources was recognized as vital for facilitating open science at a fundamental level, participants predominantly emphasized the need for a cultural shift and a change in institutional reward systems to value open science practices on a deeper level.

This study comes with certain limitations that need to be acknowledged. It is crucial to understand that the interviewees were recruited from participants of a two-day open science training workshop in Ireland, and they willingly volunteered to take part in the interviews. As a result, selection bias might occur that the study sample represents a subset of the broader target population of ECR who already possessed an interest in open science and may have had prior exposure and understanding of open science. Participating in the workshop inevitably influenced their knowledge about open science, and this aspect should be considered when interpreting the study findings. However, this also means that the participants were well-equipped to provide in-depth and insightful perspectives into a relatively unexplored area of research. Consequently, these findings can serve as valuable comparison data for future similar studies or replications among other samples of ECRs. However, further quantitative interpretation may be needed in order to find the association or factors influencing open science behaviours not only among ECR but including other academic communities as well.

Reference

1. Zečević, K., Houghton, C., Noone, C., Lee, H., Matvienko-Sikar, K., & Toomey, E. (2021). Exploring factors that influence the practice of Open Science by early career health researchers: a mixed methods study. HRB open research, 3, 56.
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3. Allen C, Mehler DMA: Open science challenges, benefits and tips in early career and beyond. PLoS Biol. 2019; 17(15): e3000246.
4. Bazeley P: Defining 'Early Career' in Research. High Educ. 2003; 45: 257–279