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Do University Research Data Management Policies Become More Open Over Time?

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Abstract

Research data management (RDM) policies are ubiquitous in UK Higher Education Institutions, and are often written and managed by, or with, the library team. RDM policies attempt to balance the requirements of keeping data safe and secure when necessary and opening up data to allow reuse and to support research integrity. This article uses a framework analysis approach on 134 policies to investigate whether the UK RDM policies have become more open over time in terms of policy points and language. The investigation shows that recent policies have shown an increased likelihood of being more open in several areas: how long data should be archived for, sharing of software, and the mandatory inclusion of data availability statements in journal articles. Language around FAIR data terms have increased, as has using research integrity as a key reason to manage data according to best practices.

Keywords: research data management; open data; policy; university

1. Introduction

Research data management (RDM) covers the entire life cycle of a research project. This includes the planning stage followed by the collection, analysis, sharing, archiving (Griffin et al., 2018), and ultimately the destruction of data (Hellmich & Dinneen, 2022). This process is crucial for ensuring that research can be trusted (Rantasaari, 2022), that participants and their data are

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protected (Karcher et al., 2023), that the funders are getting value for money, and that results are able to be built upon by other researchers (Childs et al., 2014).

Research data management has often been conflated with open research, also called open science, within UK Higher Education (Higman et al., 2019). RDM covers the management of research data both during the active research stage of the project, and afterwards to enable reuse and to support reproducibility of the findings (Surkis & Read, 2015). It is in this later stage that RDM and open research can overlap. One key tenet of open research is that the best way of storing data after a research project, and making this available to others, is through making these resources openly available via deposit into a data repository (Bertram et al., 2023). In order to make the best use of open data it is often also required to be FAIR: Findable, Accessible, Interoperable and Reuseable (Wilkinson et al., 2016).

Librarians have often spearheaded development and support of research data management practices, although this is often in collaboration with other teams. The digital age has led to librarians seeing their role in information management in a wider scope and has led to the provision of support and training for researchers in new ways (Corrall et al., 2013). Research data can be seen as simply another form of information to manage including library focused topics such as preservation, metadata and discovery (Pinfield et al., 2014), and is increasingly being seen as an important institutional, or national, collection (Borgerud & Borglund, 2020).

In some countries, such as Canada (Moher & Cobey, 2021) and China (Huang et al., 2021), some governments have taken a national approach to data management, however it is more common for countries to allow each university to develop their own policy (Liu et al., 2020). This is the case within the UK with each institution providing their own data management policy. In yet other national settings, formal policies are rarely found, or are still in their infancy (Singh et al., 2022), although institutional guidance and systems may be in place (Martin-Melon et al., 2023).

It is only relatively recently that research data management has started to be mandated by research organisations. Higher Education Institutions (HEIs) within the UK initially started to develop their own RDM policies in response to the 2011 EPSRC (Engineering and Physical Sciences

Research Council) policy (Higman & Pinfield, 2015). Although this policy only related to research funded by the EPSRC, many institutions used it as a way to kickstart the process of thinking about data management across their full research porfolio. Now nearly 15 years later, the majority of major research funders, in the UK and beyond, have requirements around data management and open research (Bloemers & Montesanti, 2020). This includes the Concordat on Open Research Data (UK Research and Innovation [UKRI], 2016) which has become a benchmarking standard in the UK, and the UKRI Open Access policy (UKRI, 2021) which included additional requirements around data availability statements. In addition to this, journals also often require data to be released at the time of publication (Prosser et al., 2023).

Research data management policies have become standard in the UK Higher Education sector (Donner, 2023), sitting alongside other policies such as data security, research integrity, and open access. The policies cover both the security and management of university assets in the form of active data, but also cover best practice in how to share and publish outputs in the form of open research. These factors have traditionally conflicted with each other (Kraus & Eberhard, 2022) but organisations have attempted an equilibrium through the adage "As open as possible, as closed as necessary" (European Commission, 2016).

Whilst funders and journals have been pushing for data to be as 'open as possible', further legislation, such as GDPR, has been developed requiring much stricter requirements around personal and sensitive data, although these regulations do not necessarily stifle data sharing and reuse as much as is often assumed (Comandè & Schneider, 2022). As a result of these developments many institutions have now undergone several iterations of their data management policies, attempting to balance the requirement to protect sensitive data, and also to open up data for reuse and for data validation where possible (Staunton et al., 2022).

Research into data management policies in the UK, USA, and Australia identified core values across policies, but also identified that policies in each national settings prioritised different areas of focus (Liu et al., 2020). The study only looked at the top 100 universities in the US News and World Report's ranking and so may miss crucial knowledge gleaned from the approaches that smaller, newer, or teaching focused universities are taking. Data policies

in highly ranked USA universities tend to focus on regulatory aspects such as intellectual property rights, access, and preservation. However, in the UK the focus is more often on data sharing and open research.

Data sharing is a strong feature in data management policies with frequently occurring discussions of retention periods and mitigations for sensitive data (Liu et al., 2020). Higman and Pinfield (2015) found that initial RDM policies in the UK were often not particularly strong advocates for data sharing, encouraging researchers to comply with the requirements of funding bodies, but no more. This may have shifted in the intervening years as Lui et al. (2020) report that all UK policies sampled required data sharing, although not the extent of this sharing or any caveats included. The concept of how policies develop over time is not something which has been previously addressed in the literature but may give insight into how RDM policies and sector best practice has changed over the last decade.

Previous analyses of UK data management policies have analysed small numbers of policies, but there has been no comprehensive analysis of all UK policies. The most recent analysis of UK policies contains a sampling of policies up to 2019 (Liu et al., 2020), however developments in the way research has been carried out in the COVID-19 and post-COVID-19 eras may have prompted universities to re-write these policies.

This analysis aims to answer the questions:

- What are the primary open research themes found in institutional research data management policies?
- Have the themes, language, and priorities of research data management policies changed between early RDM policies and those written more recently?

2. Methods

2.1. Identification of Policies

A list of UK public universities was collated from two sources: 146 universities sourced from the Wikipedia page 'List of Universities in the United Kingdom' (List of universities in the United Kingdom, 2023) and 163 universities sourced from the Times Higher Education University Rankings (Times Higher Education, 2023). The combined and cleaned list, removing teaching

institutions and colleges, consisted of 152 universities. Research data management policies for each of the UK universities were searched for through Google using the search term "[university] Research Data Management Policy". Where the policy was not immediately identifiable from this search, the library and policy webpages of the university were searched for a relevant data management policy.

Only research data management policies or sections of policies were included. Where similar content was included in an open research policy this was excluded as it would not contain a conflict between data security and open research and as such may be significantly more positive about open research. Policies were included in either pdf or webpage formats, and the webpages were printed as pdfs for analysis. If no policy could be identified through either of these approaches, or if the policy was behind a password request, the policy was not included in the study. Where versions of policies were found that preceded the current policy, these were also included to support the analysis of policies through time.

In total 134 policies were identified from 91 UK universities. These policies were 231.5k words in total and averaged 1728 per policy.

2.2. Identification and Coding of Themes

134 policies were included in the dataset. Not all universities in the original list had a policy, whilst some had policies from multiple years. Due to the large size of this corpus, ten policies were initially used to identify themes within the text. The 10 policies chosen were the first and last five universities alphabetically (Aberystwyth, Aberdeen, Abertay, Aston, Bangor, Westminster, Wolverhampton, Worcester, York, York St John). This gave a range of types, sizes and locations of universities to ensure that the coding was not biased towards the priorities of particular types of universities.

Each policy was read by the researcher and annotated with codes, terms which describe the content of paragraphs in the policy. Codes assigned to paragraphs in the policies were then collated into over-arching themes. The themes which were taken through to the analysis stage were 'Policy requirements related to openness', 'Reasons for data management' and 'Adjectives and descriptions of ideal data'. The policy requirements were terms which were highly related to open research requirements, reasons for data

management was chosen to give a better understanding of the reasons why these policies were required, and the 'adjectives and descriptions of ideal data' theme was chosen to support an understanding of what types of data were valued and prioritised within policies.

All 134 policies were deductively coded based on these codes and themes. For the adjectives, the policy had to contain the stem of the word for it to be included, the other themes were coded based on topic and meaning. In each case the meaning associated with the word was identified to ensure that other uses were not included. An example of this is the use of 'accessible' in data management to mean that it is possible to get access to the data, versus the use in the sphere of Equality, Diversity and Inclusion to specifically refer to the removal of barriers for disabled users.

A framework analysis approach (Spencer et al., 2003) was used to analyse the policies. This approach was chosen due to the large number of policies and the similarity of language found within them. A matrix was created for each of the themes chosen, with each row representing a policy, and each column representing a specific code. The 'Reasons' and 'Adjectives' theme matrix cells were filled with a 1 if the code was present in the policy and a 0 if it was not.

For the 'Policy requirements' theme, a scale was added to the coding to include the strength of the requirement instead of simply the occurrence. The scale is from 0 to 4 where 4 is a strong requirement, and the most open or all-encompassing of regulations, and 0 is no mention of the topic at all. The policy matrix was then populated with a number from 0 to 4 representing the openness of the policy (Table 1). The matrices can be found at https://doi.org/10.25418/crick.28742384.

2.3. Analysis of Themes

The R statistical software package was used to analyse the data and scripts have been made openly available (R version 4.3.3; RStudio 2024.12.0+467 "Kousa Dogwood" Release).

To identify whether there was a change in frequency of the codes identified over time in the 'Adjectives' and 'Reasons' analysis, Mann–Kendal statistical tests were carried out using the percentage occurrence of a code in policies from each year. Tests were carried out for policies from the last 10 years and

Table 1: Definitions of the scale used for the policy requirements framework analysis.

Score	0	1	2	3	4
Deposit	No mention	Mentioned	Encouraged	Required	Checked
Retention	No mention	In accordance with policy	<5 years	5≥ years	Indefinitely
Licensing	No mention	Don't give away rights	Have a license	Have an open license	Only CC-BY/CC0 or similar
Software	No mention	Included as data	Encouraged	Required	Required with repository snapshot
Timeframe	No mention	Minimum delay/End of project	Publication (with embargo or delay allowed)	At time of publication	At time of collection/As soon as possible
DAS (data availability statement)	No mention	Mentioned	Encouraged	Required	Must contain link, No 'available on request'
Catalogue	No mention	Mentioned	Encouraged	Required	On collection
DMP	No mention	Only if required by funder	Encouraged/ Subset required	Required	Signed off
Scope	No mention	PI only	All Staff	Staff & PGRs	Everybody

for codes with more than 5 occurrences to reduce the effect of low numbers skewing the percentages. Tests were conducted in R using the zyp package. The H0 hypothesis is that there was no change in the percentage of policies containing a code over time.

The policy matrix was analysed using Anova tests to determine whether there was a difference in the mean age of the policy for different points on the scale of the categories. A Spearman correlation was used to see if there was a correlation between the openness of the category and the date of the policy. A permutation test was used to determine if this was a statistically significant difference from 0. Spearman was used because of the lack of assumption of normality, and the ranked, rather than absolute, nature of the policy variables.

3. Results

Current research data policies were identified from 94 UK Universities. A further 40 legacy policies were also collected, totalling 134 policies. Policies

were found as either pdf files or webpages which were printed to pdf by the researcher. The oldest of the data policies was created in 2011, the newest in 2024 (range = 13 years). The mean date was 2019 and the frequency of policies was skewed towards newer policies. Many policies gave a date for when the policy should be reviewed and updated. However, these deadlines were often not adhered to.

Seven themes were identified within the policies: Administrative information and requirements; Reasons for data management; Adjectives and descriptions of ideal data; Policies and constraints; Stages of data management; Services supporting data management; Requirements of the policy. This paper will look in more detail at 'Requirements of the policy', 'Adjectives and descriptions of ideal data', and 'reasons for data management' to determine whether there are differences in these themes which can be attributed to the age of the policy. Other themes, whilst interesting for future analyses do not contribute to a greater understanding of the openness of the policy.

3.1. Requirements of the Policy

Nine open research related requirements were identified: whether data should be deposited in a repository (Deposit), minimum length of time data should be kept (Retention), licensing of datasets (Licensing), whether software should be shared or deposited in a repository (Software), timeframe for deposit of data (Timeframe), requirement for a data availability statement (DAS), requirement to register the data with the HEI through a catalogue entry (Catalogue), requirement for a data management plan (DMP), who the policy is for (Scope).

Four of the policy requirements show a statistically significant positive spearman correlation between the openness of the policy and the date that the policy was written. These policy requirements are: Retention ($r=0.192$, $p=0.028$), DAS ($r=0.224$, $p=0.009$), Software ($r=0.307$, $p=5.0e^{-4}$), and Scope ($r=0.277$, $p=0.002$). The total openness score for each policy also showed a correlation between the score and the date of the policy ($r=0.342$, $p=1.5e^{-4}$) (Figure 1).

3.2. 'Reasons for Data Management'

The reasons given within the policies for research data management were clustered into 11 terms: Benefits, Compliance, Ethics, Impact, Positive Reputation, Public Interest, Research Excellence, Research Integrity, Reuse and collaboration, Risks and Value. Of these, only Research Integrity was shown to be statistically likely to be more frequently found in policies over time (p=0.007) (Figure 2).

3.3. 'Adjectives and Descriptions of Ideal Data'

19 adjective codes were identified and 16 of these were identified in at least five of the policies: Accessible, Accurate, Authentic, Available, Complete, Discoverable, FAIR, Findable, Identifiable, Interoperable, Open, Reliable, Retrievable, Reusable, Timely and Valuable. Of these, five were shown to be statistically likely to be increasing in occurrence over time: FAIR (p=0.004), Findable (p=0.006), Identifiable (p=0.049), Interoperable (p=0.003) and Valuable (p=0.019).

Fig. 1: A bar chart showing the mean of the total policy scores for policies created in each year.

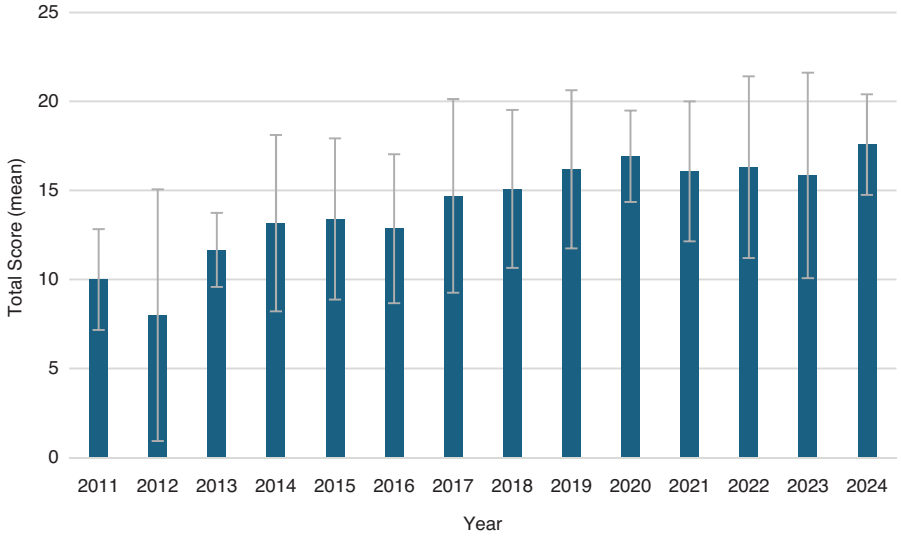
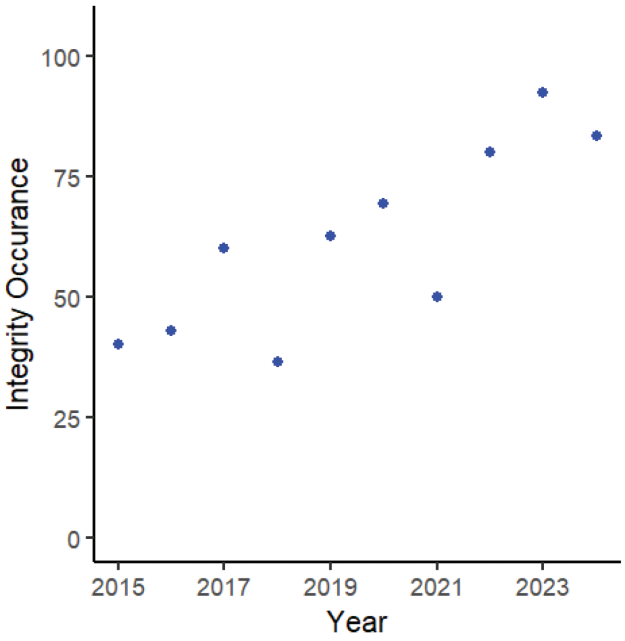


Fig. 2: Graph showing the percentage of policies from each year which gave research integrity as a reason for data management requirements. The full set of graphs can be found at https://doi.org/10.25418/crick.28788704.

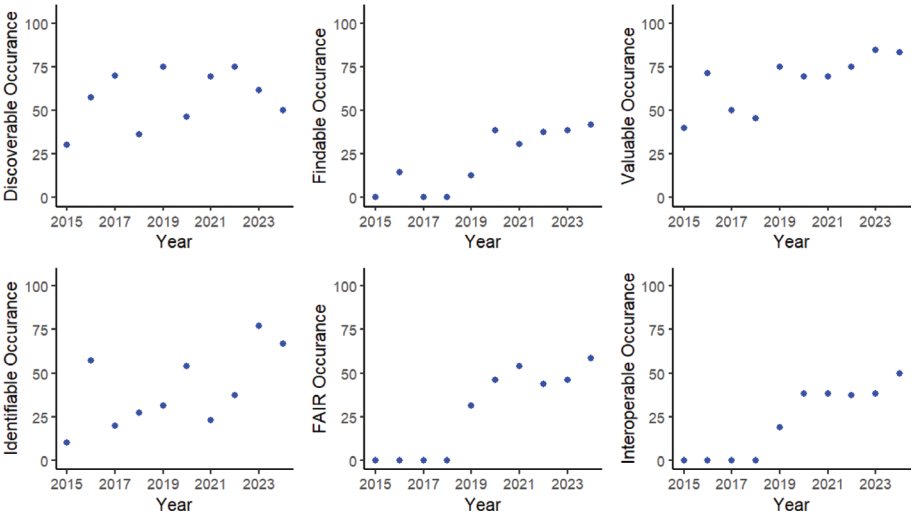


The terms Open, Accessible, Available and Reuseable were all identified in over 90% of the policies, with no significant increase in occurrence over time. These are core concepts in research data management and are present even in the earliest written policies. Outside of these four core concepts the adjectives used to describe data in policies vary considerably, although many of these variations do not appear to be related to the age of the policies. The descriptor FAIR (Findable, Accessible, Interoperable and Reuseable) is often thought to be synonymous with the modern understanding of open data. However, it can only be found in approximately half of modern policies. Descriptions of data as Findable and Interoperable are found still less frequently (Figure 3).

4. Discussion

The analysis shows the overall distribution of openness is correlated with the date of the policy, even though many of the individual policy requirements are

Fig. 3: Graphs show the percentage of policies from each year which included a specific adjective. Graphs have been included for the five adjectives found to be significantly likely to be increasing over time plus discoverable to allow comparisons with findable. The full set of graphs can be found at https://doi.org/10.25418/crick.28788704.



not becoming more open over time. A jump in total score can be seen between 2016 and 2017 which is likely to be due to the signing of the Concordat on Open Research Data (UKRI, 2016), encouraging HEIs to embed open data into their research practices. The increase in openness appears to be driven by changes in policy in just a few areas rather than in all categories.

Where policy and language are becoming more open, one possible reason for this is that it is in response to specific changes in either the UK or global HEI or scholarly communications landscape. Language use around 'FAIR data' only starts to be explicitly included from 2019 (Figure 3) though these terms were introduced in 2016. External policy developments may have cemented and accelerated this change, particularly the Sorbonne Declaration which was signed by the Russell Group universities in January 2020 (Sorbonne declaration on research data rights, 2020) and commits to supporting researchers and institutions in making their data FAIR.

Policy and language use in areas that have not been directly subject to policy changes appear to be fairly static, or stochastically distributed. Whilst areas

with external pressure appear to be slowly becoming more open, lending weight to the theory that these changes are likely to be driven by external policies. No areas were identified where the policies were becoming more closed over time. Although change seems to be slow, it is moving in an open direction.

Requirements around data availability statements are one of the areas which are becoming more open over time. The requirement for including a URL or DOI, or at the least making it clear that "a simple direction to interested parties to' contact the author' is not sufficient" (Liverpool University Research Data Management Policy, 2019) has only been seen in policies written in 2019 or later. This may be in response to the changes in UKRI open access policy, being discussed that year, which asked that a DAS be included in all UKRI funded publications (UKRI, 2023), although UKRI did not introduce any requirements around the form that the DAS should take. Despite not requiring URLs or DOIs, the consultation and subsequent policy change has substantially increased the visibility of DAS as a way of making data more discoverable and this may have had an influence on policy writers. Studies have shown that data availability statements which do not specify where the data has been deposited and any requirements for access do not fulfil the promise of the statement (Tedersoo et al., 2021). It is therefore a positive development that HEIs seem to be becoming more likely to require greater openness of the data shared in this way.

Newer policies were significantly more likely to include information about sharing, depositing or licensing software. In over 70% of policies there is no mention of software, algorithms, scripts or coding. Where software is mentioned, it is usually in the section which defines the term 'data'. However, in recent policies software licensing and sharing has been more likely to be explicitly included, showing and increased understanding of open research and the importance of research code in replicability studies. The earliest policy seen to include software in its own right is the Edinburgh University (Edinburgh University Research Data Management Policy, 2021) policy. Early research data management positions were frequently driven by Edinburgh University's efforts in both policy and education (Rice & Haywood, 2011), so it is perhaps not surprising to see the same university driving positive change towards open data 10 years later.

Where a minimum length of time that data should be kept is stipulated in policies, it is most frequently greater than 5 years and often specified as 10 years in keeping with the UKRI Guidance on best practice in the management of research data (UKRI, 2015). The length of time the data should be kept for does appear to be positively correlated with the date of the policy, with later policies suggesting that data should be kept for longer. UK HEIs do not generally stipulate any reasons why data should be kept indefinitely. As in many other national settings (National Research Council, 2007), a balance must be struck between preservation and cost, and availability, of storage space. Many policies do allow for data to be kept longer where it is still of use and some policies specify that data can be kept longer where 'the data has a public interest or heritage value' (University of Southampton Research Data Management Policy, 2024). It is common to see statements in policies suggesting that "eligible costs should be included in grant applications", something that researchers are often unaware that they can do (Donaldson & Ensberg, 2018). Grant funding, however, is not always suitable for sustaining long term preservation costs (Zielinski et al., 2019).

One further policy point which showed a change correlated with date was the scope of the policy in terms of which researchers and students this included. In early policies it is quite common to find that only principal investigators or those with external grants are covered whereas by 2024 the majority of policies (75%) included everybody conducting research, whether that was a staff member or an undergraduate project student. The inclusion of students under these policies points towards the belief that research data management, and open research, is important in its own right, rather than as a need to comply with external policies – the research carried out by taught students is rarely covered by open access mandates.

Data was described using a variety of different adjectives, usually representing the ideal state of the data, with some more popular than others. Only 16 adjectives were identified in more than 5 of the policies and data is described in standard terms across policies. Of the five terms which were found to be more common in recent policies than in older polices, three of these were associated with FAIR data: FAIR, Findable, and Interoperable. Accessible and Reuseable were found to already be in common usage before 2016 when the FAIR acronym was coined. Although these terms appear to be increasing in frequency with time, they are still far more rarely included in policies

than might be expected, given the ubiquity of the term FAIR. 'Discoverable' is often used instead of 'Findable' which may be seen as a more appropriate term and was already in use. 'Interoperability' is one of the more difficult concepts in FAIR data and so may often be excluded for that reason, it is also usually a concern for infrastructure providers rather than for individual researchers. In addition to the terms related to FAIR, the other adjectives where the likelihood of being included within a policy was shown to be statistically likely to be increasing over time were 'Valuable' and 'Identifiable'. These may be related to an increasing understanding of the importance of data in both research integrity matters and in the promotion and reuse of research.

In some cases, adjectives were identified as phrases rather than individual words where reuse and sharing of text between policies could be identified. A clear example of this is a set of four descriptors, "Accurate, complete, authentic and reliable", frequently found together using a very similar sentence structure, implying that policies frequently borrow language from one another. These four adjectives were primarily found as a single unit, and although it is unclear where this text originated from, the earliest RDM policy it was found in was the UCL (University College London) policy from 2013. However, this same language can be identified much earlier than this within a Jisc circular report on records management from 2004 (Hare, 2004). The origin of this statement was not relating to research data, but about records management. It may be that over the years the two have been conflated. This specific wording can also be found in policies and guidance outside of HEIs (British Ecological Society, 2014), and outside of the UK in, for example, the USA (Marsteller, 2025), Aotearoa New Zealand (Auckland University of Technology, 2025), Singapore (National University of Singapore, 2025), and Canada (Memorial University, 2024). The inclusion of these terms in so many policies highlights the lack of independence between policies. Language and policies are frequently borrowed when developing policies and this may be one way in which in new developments spread throughout the sector.

The reasons given for data management do not seem to change over time, but instead seem to be more closely tied to a longer-term understanding of the values of the institutions in question. The exception to this is 'research integrity' which does seem to have increased in frequency over time. It is unsurprising that it is research integrity that is identified as the outlier here. This topic has been increasingly in the spotlight due to increased retractions,

reproducibility crises, and the use of generative AI. It is therefore to be expected that HEIs have been paying more attention to the issue in recent years.

5. Limitations

The policies included in this analysis are a subset of the UK HEI landscape. Some policies weren't included because they were for internal use only and not shared with the public. Other policies were excluded from the analysis because universities had created open research policies rather than research data management policies. These policies do not have the conflict between data security and openness and so were not included. This could, however, have led to the universities which were most advanced in their championing of open research being excluded from the analysis.

Multiple policies from the same institution were included to facilitate the analysis of change over time. Data points are not independent because of this.

Only one researcher carried out the coding and analysis of policies. This leads to a possibility of bias.

6. Conclusions

Research data management policies in UK HEIs do appear to be encouraging greater openness of data over time. However, the increase in openness from the oldest to the newest policies can only be said to be occurring in a small number of areas. In particular, recent policies have shown an increased likelihood of being more open on the topics of how long data should be archived for, sharing of software, and the mandatory inclusion of data availability statements in journal articles. Although the increase in openness and positive descriptions of data over time are only in a small number of areas, no significant reduction in openness associated with time was found in any of the areas.

When discussing data, institutional policies have been much more likely to describe ideal data as FAIR in recent policies. Although the concept of FAIR

data was introduced in 2016, we don't see it starting to be introduced to policies until 2019, this may simply be a result of it taking time to filter into general use after the initial publication of the idea but may also have been encouraged by external policies such as the Sorbonne Declaration. When considering the reasons that institutions give to encourage researchers to take part in good data management practices, only research integrity shows an increased inclusion in policies over time.

Frequently we see that changes in policies occur in a way that may be due to external factors such as changes in the legislation, or widespread adoption of a new policy by other universities. Institutions do seem to want to promote open research, and over time the requirements have become stronger. Both external policy changes and the behaviour of other institutions seems to be driving this change. This gives considerable power to those who wish to push forward the ideals of open research.

Data Availability Statement

Code associated with this article can be found in https://doi.org/10.25418/crick.28788704. The framework analysis matrices showing the distribution of the data can be found at https://doi.org/10.25418/crick.28742384.

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