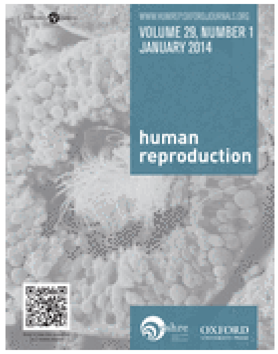

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Research Funding for Male Reproductive Health and Infertility in the UK and USA [2016 – 2019]

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Manuscripts

Research Funding for Male Reproductive Health and Infertility in the UK and USA [2016 – 2019]

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Abstract:

Title: Research Funding for Male Reproductive Health and Infertility in the UK and USA [2016 – 2019]

Study question: What is the research funding for male reproductive health and infertility in the UK and US between 2016 to 2019?

Summary answer: The average funding for a research project in male reproductive health and infertility was not significantly different to that for female-based projects (£653,733 in the UK and $779,707 in the US). However, only 0.07% and 0.83% of government funds from NIHR (UK) and NICHD (USA) was granted for male reproductive health, respectively.

What is known already: There is a marked paucity of data on research funding for male reproductive health.

Study design, size, duration: Examined government databases over a total 4-year period from January 2016 to December 2019.

Participants/materials, setting, methods: Information on the funding provided to male-based and female-based research was collected using public accessed web-databases from the UKRI-GTR, the NIHR's Open Data Summary, and the US' NIH RePORT. Funded projects that began research activity between January 2016 to December 2019 were recorded, along with their grant and project details. Strict inclusion-exclusion criteria were followed for both UK and US data with a primary research focus of male infertility, reproductive health and disorders, and contraception development. Funding support was divided into three research groups: male-based, female-based, and not-specified research. Between the 4-year period, the UK is divided into 5 funding periods, starting from 2015/16 to 2019/20, and the US is divided into 5 fiscal years, from 2016 to 2020.

Main results and the role of chance: Between January 2016 to December 2019, UK agencies awarded a total of £11,767,190 to 18 projects for male-based research and £29,850,945 to 40 projects for

female-based research. There was no statistically significant difference in funding average between the two research groups (P=0.56, W=392). The US NIH funded 76 projects totaling $59,257,746 for male-based research and 99 projects totaling $83,272,898 for female-based research. There was no statistically significant difference in funding average between the two groups (P=0.83, W=3834).

Limitations, reasons for caution: The findings of this study cannot be used to generalize and reflect global funding trends towards infertility and reproductive health as the data collected followed a narrow funding timeframe from government agencies and only two countries. Other funding sources such as charities, industry and major philanthropic organizations were not evaluated.

Wider implications of the findings: This is the first study examining funding granted by main government research agencies from the UK and US for male reproductive health. This study should stimulate further discussion of the challenges of tackling male infertility and reproductive health disorders and formulate appropriate investment strategies.

Study funding/competing interest(s): CLRB is Editor for RBMO and has received lecturing fees from Merck, Pharmasure, and Ferring. His laboratory is funded by Bill and Melinda Gates Foundation, CSO, Genus. No other authors declare a conflict of interest.

Introduction.

Several recent studies have highlighted considerable research gaps in the understanding of male infertility encompassing critical areas such as basic science research, clinical diagnostics, non-Medically Assisted Reproduction (MAR) treatment options, and the impact of damage to the male genome on the health of the next generation (Barratt *et al*., 2017, Barratt *et al.*, 2018, De Jonge and Barratt 2019, Barratt *et al*., 2021, Schlegel *et al*., 2021a,b). One general conclusion that can be drawn from these analyses is that significant funding is required to address the research questions (Barratt *et al*., 2017, Barratt *et al.*, 2018). For any discipline, including reproductive medicine, an important aspect of assessing and formulating future funding requirements is to ascertain current funding. This knowledge can then be used to facilitate an objective needs analysis.

Surprisingly, there is a paucity of data on funding levels for male infertility and male reproductive health research (Barratt *et al.,* 2018, Barratt *et al.,* 2021). To date, only one study has specifically documented funding for male reproductive health research. Liao and colleagues (Liao *et al.,* 2020) assessed funding by the National Natural Science Foundation of China (NNSFC) for male infertility and reproductive health research between 1998-2018. The authors split this 20-year period into 3 funding phases beginning from 1998. By the third phase (2010-2018), a substantial increase of funding was awarded for male reproductive health (MRH) basic research by the NNSFC. However, there was minimal detail on the exact funding values. Barratt and colleagues provided a snapshot of funding for Male Reproductive Health in several countries that suggested overall funding levels were low, but no other details were provided (Barratt *et al*., 2021).

In this study, we investigated government funded support of male reproductive health research. We examined research funded between January 2016 to December 2019 from the UK and US agencies. To provide context, we included funding for female-based reproductive health research and examined the proportion of research funding for reproductive health research and compared to the total research funding.

Materials and Methods:

Experimental Design:

Publicly accessible UK Research and Innovation (UKRI), National Institute for Health Research (NIHR), and National Institutes of Health (NIH) funding agency databases covering awards from January 2016 to December 2019 were examined (see Supplementary Table I). Following the inclusion and exclusion criteria outlined within Supplementary Tables II and III, funding data were collected on research proposals investigating infertility and reproductive health. For simplicity, these are referred to collectively as 'infertility research'. As the primary focus of this research is on infertility, the data were divided into three main groups: male-based, female-based, and not-specified (Supplementary Table II). The first two groups covered projects whose primary aim, based on the information presented in the research abstracts, timeline summaries and/or impact statements, was male- or female-focused. "Not-specified" includes research projects that have either not specified a primary focus towards either male or female or have explicitly stated a focus on both. The process was conducted and reviewed by E.G. with C.L.R.B. Total funding for all three groups, funding over time, and comparison with overall funding for a particular agency was examined.

UK Data Collection:

Starting in April 2018, the UK research councils, Innovate UK, and Research England were combined reporting under one organization, the UKRI (UKRI, 2019). The councils, such as the Medical Research Council (MRC), Biotechnology and Biological Sciences Research Council (BBSRC), Engineering and Physical Sciences Research Council (EPSRC), and Natural Environment Research Council (NERC), independently fund research projects according to their respective visions and missions; however, from 2018/19, their annual funding expenditures were reported under the UKRI's annual reports and budgets. The UKRI's Gateway to Research (UKRI-GTR) web-database allows users to analyse information provided on taxpayer-funded research. Relevant search terms such as "male infertility" or "female reproductive health" (see Supplementary Table II) were applied with appropriate database filters (Supplementary Table I). The project award relevance was determined by assessing the objectives in project abstracts, timeline summaries, and planned impacts. Supplementary Tables I, II and III provide the search filters and the reference criteria for inclusion/exclusion utilized for analysis. The UKRI-GTR provides the total funding amount granted to the projects within a designated period.

The Open Data Summary View dataset from the NIHR was used as it provided details on funded projects, grants, summary abstracts, and project dates. Like the UKRI data, the NIHR excel datasheet had specific search terms and filters applied to exclude irrelevant projects (Supplementary Tables I, II, and III).

The UKRI councils and NIHR report their annual expenditure and budgets for 1st April to 31st March. Thus, the selected projects will fall under the funding period of when their research activities begin, e.g. if a research project is started between May 20th, 2017, to March 20th, 2019, the project will be categorized under the funding period 2017/18. The projects assessed would begin their investigations between January 2016 to December 2019, therefore 5 consecutive funding periods were examined (2015/16, 2016/17, 2017/18, 2018/19, and 2019/20).

<u>US Data Collection:</u>

The NIH has a research portfolio online operating tools site (RePORT) providing access to their research activities, such as previously funded research, actively funded research projects, and information on NIH's annual expenditures. The RePORT-Query database has similar features as the UKRI-GTR and NIHR such as providing information on project abstracts, research impact, start- and end-dates, funding grants, and type of research. The same inclusion-exclusion criteria were applied as for the UK data collection, (see Supplementary Tables I, II, and III).

In contrast to the UK funding agencies, the NIH's fiscal year (FY) funding follows a calendar period from October 1st to September 30th, *i.e.,* FY2016 comprises funding activity from October 1st, 2015, to September 30th, 2016. Projects running over one calendar period are reported several times under consecutive fiscal years and the funds are divided according to the annual period of the project's activity.

During data collection, 74 projects were found as active with incomplete funding sums as the NIH divides the grants according to the budgeting period of every FY. The NIH are in the process of granting funds for the FY2021, so projects ending in FY2020 or FY2021 have provided a complete funding sum. For the active projects ending after 2021, incomplete funding data is shown. It is assumed the funding will increase in value by the time the research project ends in the future. To remain consistent with the UK data, projects granted funding are totalled as one figure and recorded under the FY the project first began research, whether they are active or completed. Thus, the US funding is referred to as "Current Total Funding". For the US, the initial data collection period ran between October 2020 to December 2020 but then restarted for a brief period in January 2021 to complete the remaining funding values for several of the active research projects.

Data Analysis:

The data were divided into the three groups and organized into the funding period or FY during which the project was first awarded. R-Studio (Version 1.3.1093) was utilized for the data analysis. Box-and-whisker plots are presented with rounded *P*-values. Kruskal-Wallis and Wilcoxon Rank Sum tests were generated to assess any statistical significance. The data were independently collected and do not assume a normal distribution, so rank-based, non-parametric tests such as the Kruskal-Wallis and Wilcoxon Rank-Sum were used. The Kruskal-Wallis test was used between more than 2 groups, with the *P*-values and Chi-Squared (χ^2) values provided. The Wilcoxon test was used between two groups with the *P*-value and the Wilcoxon test statistic, *W,* included. *P*-values <0.05 were considered statistically significant.

Results.

Total and Median Funding:

UK Data:

Total funding for infertility from the UK funding agencies and the summary statistics of the UK data are presented in Tables I and II. Table III details the proportion of funding by the MRC and NIHR from 2015/16 to 2018/19. Between 2016 to 2019, 76 studies were awarded funding by 4 UKRI councils and the NIHR investigating infertility and reproductive health. The MRC, BBSRC, and NIHR were the top 3 awarding agencies, having funded 29, 23, and 15 projects, respectively. The UK agencies have awarded 18 projects for male-based, 40 for female-based, and 18 projects for the non-specified group (Table I). For NIHR funding, there were only 2 awards for the male group compared to 11 for female group. Figure 1 presents a distribution of funding for the three groups. There was more spread for the female group, however there was no statistically significant difference between the mean values of the 3 groups (P=0.69, Kruskal-Wallis, χ^2 = 0.72). There was no significant difference between male-based versus female-based funding (P=0.56, W=392).

USA Data:

The US total funding for infertility and summary statistics are presented in Tables IV and V. The funding amounts presented in Table IV includes research grants, program grants, and fellowships and contains the respective annual spending of each NIH institute. The NIH have awarded 76 projects for male-based, 99 for female-based, and 31 projects for the non-specified group. The National Institute of Child Health and Human Development (NICHD), Environmental Health Sciences (NIEHS), and General Medical Sciences (NIGMS) have awarded the most for infertility research out of 14 institutes, funding 138, 27, and 26 projects, respectively.

The spread of funding is not largely different between the male-based and female-based groups (Figure 2), but more projects appeared to localize at the lower end of the scale for the female-based group. However, there was no statistical difference between the mean values of the 3 groups (*P*=0.16, Kruskal Wallis χ^2= 4.1). There were no significant differences between male- and female-based research *(P*=0.83, *W*=3834).

Funding over the years:

Funding over 4 consecutive years is presented in Supplementary Tables IV and V for the UK and US, respectively. The total funding, mean funding amount over the respective funding periods, and the distribution of data are presented in Supplementary Figures 1 and 2. There were no statistical significant difference in the funding over time within each of the 3 groups *(P*>0.05, Kruskal-Wallis), for both the UK and US.

Proportion of Funding for Infertility and Reproductive Health Research in UK and USA:

The proportion of funding allocated to male and female infertility research is presented in Table III for UK and Table VI for US. The MRC fund research for reproduction and infertility and the NIHR have a dedicated research specialty for Reproductive Health and Childbirth (NIHR, 2021). When examining funding allocated directly for infertility research by the MRC, the proportion of total funding peaks at 1.58% in 2016/17 (Table III). For the NIHR, the largest proportion of funding allocated to infertility research was in 2019/20 with 2.31% of the year's total awards. When examining total funding by the NIHR between 2015/16 and 2019/20, the proportion of funding for male-based infertility research was 0.07% and 0.79% for female-based research.

In the USA, of the 27 NIH institutes and research centres, the NICHD is a primary funder for furthering research on human development, improvement for reproductive health, and enhancing the lives of children and young adults (NIH, 2021). This also encompasses research for infertility and contraception development. The NICHD's annual funding for research between fiscal years 2011 and

2020 was between $873 million to $1.1 billion (REPORT, 2021). In the FY2016, NICHD funded $1,021,132,045 for research grants and fellowships, but only 1.63% or $16,684,751 was for infertility research (as defined by the eligibility criteria in this study; Table VI). The funding proportion for the male-based research group was 0.48%, which was similar to the female-based funding proportion, 0.51%. The proportion of total funding provided by the NICHD between 2016 and 2019 that was allocated to infertility research was estimated at 2.56%, with male-based receiving 0.83% and female-based receiving 1.32%.

Discussion.

This study provides details of UK and US government funding for male infertility and male reproductive health covering the period 2016-2019. The information will be instructive for different stakeholders, *e.g*. workers in the discipline, grant organisations, commercial companies, and policy makers. This will enable the development of evidence-based informed decisions for future funding strategies This is critical as male infertility poses a global health risk for many millions of men yet research funding is not concomitant with the prevalence or impact of the disease.

We analysed public-accessible databases for UKRI, NIHR (UK) and US (NIH) covering the period of awards from January 2016 to December 2019. The primary objective was to determine funding for male reproductive health and infertility research. To provide context, we assessed 3 groups based on the primary focus of the research in reproductive biology/medicine: male-based, female-based, and not-specified (Supplementary Table II). Information from the aims, research abstracts, timeline summaries, and/or impact statements, was used to determine if a study was included and, if so, to which group it was assigned. This is necessarily a subjective process, therefore we provide our search and entry/exclusion criteria (Supplementary Tables I, II, and III), as well as a supplementary table of the research projects' titles from the UK and US (Supplementary Tables VI and VII). Whilst incorporation of different terms may produce different answers, the results are robust. For example, the application of data extraction is consistent between countries as the inclusion/exclusion criteria were the same. We were focused on infertility and associated links to infertility and reproductive disorders. No analysis was made to assess if there is bias in funding research for female reproduction versus male reproduction. Moreover, we do not examine submission numbers, triage, rejection rates, etc. and thus prioritization of research cannot be assessed.

Although the number of awards for female-based research is generally higher than for the male group (ratio of ~2:1 in UK, and 1.3:1 in USA), the average amount awarded per project was not significantly different in either country (see Tables II and IV, Figures 1 and 2), indicating that funding per project is not different between male and female reproductive health.

An important question to answer is, what is the proportion of funding for reproduction/male reproductive health compared to general research funding? There are several approaches to address this question. For both the UK and USA data, one method is to examine the total funding for research by the main funding agency and compare this to the data for male- and female-based research. Reproductive health research is primarily supported by the MRC and NIHR in the UK, and by the NICHD in the USA. In the funding periods 2015/16 to 2017/18, the total infertility research funding by MRC ranged from 0.87% to 1.58% of the total budget (Table III). Infertility research funding from NIHR ranged from 0.08% to 2.31% (2015/16 to 2019/20, Table III). For the US, the maximum infertility research funding by the NICHD was 3.39% of its total budget (Table VI).

Another approach was to assess the proportion of funding compared between research disciplines, or research categories, in the UK and USA, respectively. Within the UK data, we specifically examined research disciplines funded by the NIHR. From the April 1st, 2011 to present, the NIHR awarded over £216 million for Reproductive Health and Childbirth research, their 7th largest funding category. Mental Health, Cancer, and Cardiovascular Diseases were within the top 5 most funded categories (Supplementary Table VIII). NIHR awarded £21 million in 2017/18 for Reproductive Health and Childbirth research (NIHR, 2021), yet surprisingly there was minimal support towards male-based research as between 2016 to 2019 only two projects were funded (Table I, Supplementary Table VI). The small number of projects in male reproductive health funded by the NIHR was unexpected as NIHR are the largest UK funders for health care and clinical research (NIHR, 2021). NIHR supported 302 studies for reproductive health with 94 of them being newly funded projects for 2019/20. However, using our criteria for study inclusion we only identified 4 projects focusing on infertility over the whole period (Table I, Supplementary Table IV). While we do not know the reason for the low funding rate, a plausible explanation is that, as NIHR fund a significant number of clinical trials, there may not have been sufficient high quality candidates for either diagnostic and/or treatment trials to be developed in male reproductive health (Barratt *et al.*, 2021).

To compare different research categories for the USA data, we did not use our collected data to provide estimated funding. Instead, we used the NIH's *Research Portfolio Online Reporting Tools* estimates of funding for various Research Condition and Disease Categories (RCDC) (https://report.nih.gov/funding/categorical-spending#/) and the NIH's annual research grants (https://report.nih.gov/funding/nih-budget-and-spending-data-past-fiscal-years/budget-and-spending). For the NIH, the values presented for the 299 RCDCs are not mutually exclusive because a project can fall under several categories. We examined research categories similar to those at the NIHR. For NIH these included: Contraception/Reproduction, Infertility, Obesity, and Mental Health (Supplementary Table IX). By estimating the proportion of funding for these categories from the NIH's Total Research Funding, we can see those categories such as Obesity and Mental Health were highly funded in comparison to Contraception/Reproduction and Infertility.

NICHD has funded under 1% of their annual research grants for male-based research for 3 out of 4 consecutive fiscal years (Table VI). NICHD are primary funders for reproduction, infertility, and contraceptive development, therefore, it was unexpected to observe such low funding proportions. A possible factor for why our calculated funding proportion values by the NICHD are low may be due to our strict eligibility criteria during data collection. However, we applied our eligibility and exclusion criteria equally across all funding agencies, for the UK and US.

Two pertinent points arise from our study. Firstly, compared to the prevalence of the disease where 1:7 couples are infertile (Boivin *et al.*, 2007, NICE, 2013), the proportion of research funding for male reproductive health is small (less than 1%, see Tables III and VI) compared to other diseases in the UK and US (Supplementary Table IX). This is surprising especially because MAR is a multi-billion-dollar global industry. Secondly, although the number of awards for female-based research is generally higher than for the male group (ratio of ~2:1 in the UK and 1.3:1 in the USA), the average funding awarded per project is not significantly different in either UK or USA (see Tables II and IV; Figures 1 and 2). Whilst there are many challenges in comparing research funding between disciplines, the present findings directly imply a significant gap between impact of disease prevalence and research funding to investigate the disease, e.g., diagnosis and treatment. This apparent gap requires further detailed analysis and should include a comprehensive assessments of the health economic impact of male reproductive health.

There are several limitations to our study. Firstly, these findings cannot be generalized to reflect funding trends towards infertility and reproductive health worldwide. The data were collected from governmental agencies of two countries and over a narrow funding period. Further, the funding priorities of UK and US governmental agencies may not be a 'good fit model' for the funding priorities of government research agencies in other countries. Secondly, only government funding was investigated. We did not examine funding from non-governmental organizations (NGO's), *e.g.* Wellcome Trust, industry, Bill and Melinda Gates Foundation, and other major philanthropic organisations. As the UKRI, NIHR, and NIH are governmental agencies, their prioritization to providing fellowships, research grants, program centre grants, and others may not be similar to other charities and international organizations. Detailed analysis of funding from these other agencies would be instructive and assist in a more comprehensive analysis. Future work should include data from more countries, NGO's and include longer funding timeframes to accurately estimate total funding supporting for male infertility and male reproductive health and for more comprehensive assessment of funding trends.

In summary, we present recent government funding for male-based infertility and reproductive health, and by extension, funding towards female-based research. The information provided in this study should be useful for a variety of stakeholders as discussed earlier. A sentinel message is that whilst male infertility poses a global health risk for many millions of men, research funding to develop better diagnostic tools and treatment regimens is not on par. The data analysis presented herein should stimulate discussions for a strategic development of male reproductive health care investments.

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Conflicts of Interests:

CLRB is Editor for RBMO and has received lecturing fees (2019) from Merck, Pharmasure, and Ferring. His laboratory is funded by Bill and Melinda Gates Foundation, CSO, Genus. No other authors declare a conflict of interest.

Authors Roles:

The experimental design, primary data collection, and initial statistical analysis was performed by EG as part of her undergraduate BSc honours research project. The initial draft of the manuscript was written by EG and CB following discussions with CJD. All authors contributed to writing and editing the manuscript and approving the final version.

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No specific funding was provided for data collection and/or analysis for this study. Whilst undertaking this work EG was a BSc Biomedical Sciences honours student at University of Dundee, School of Life Sciences, Dundee. ESHRE have provided funds to facilitate meetings and interactions of the MRHI Working Group.

Data Availability Statements:

The data underlying this article are available in the Dryad Digital Repository at https://doi.org/10.5061/dryad.v9s4mw6wc.

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Main Figures

Figure 1: Box-and-whisker plot with a 95% confidence interval (CI) of awards for UK infertility and reproductive health research under the three research categories: male-based, female-based, and not-specified. 18 projects were funded for male-based research, 40 projects for female-based, and 18 for not-specified by the UKRI and NIHR.

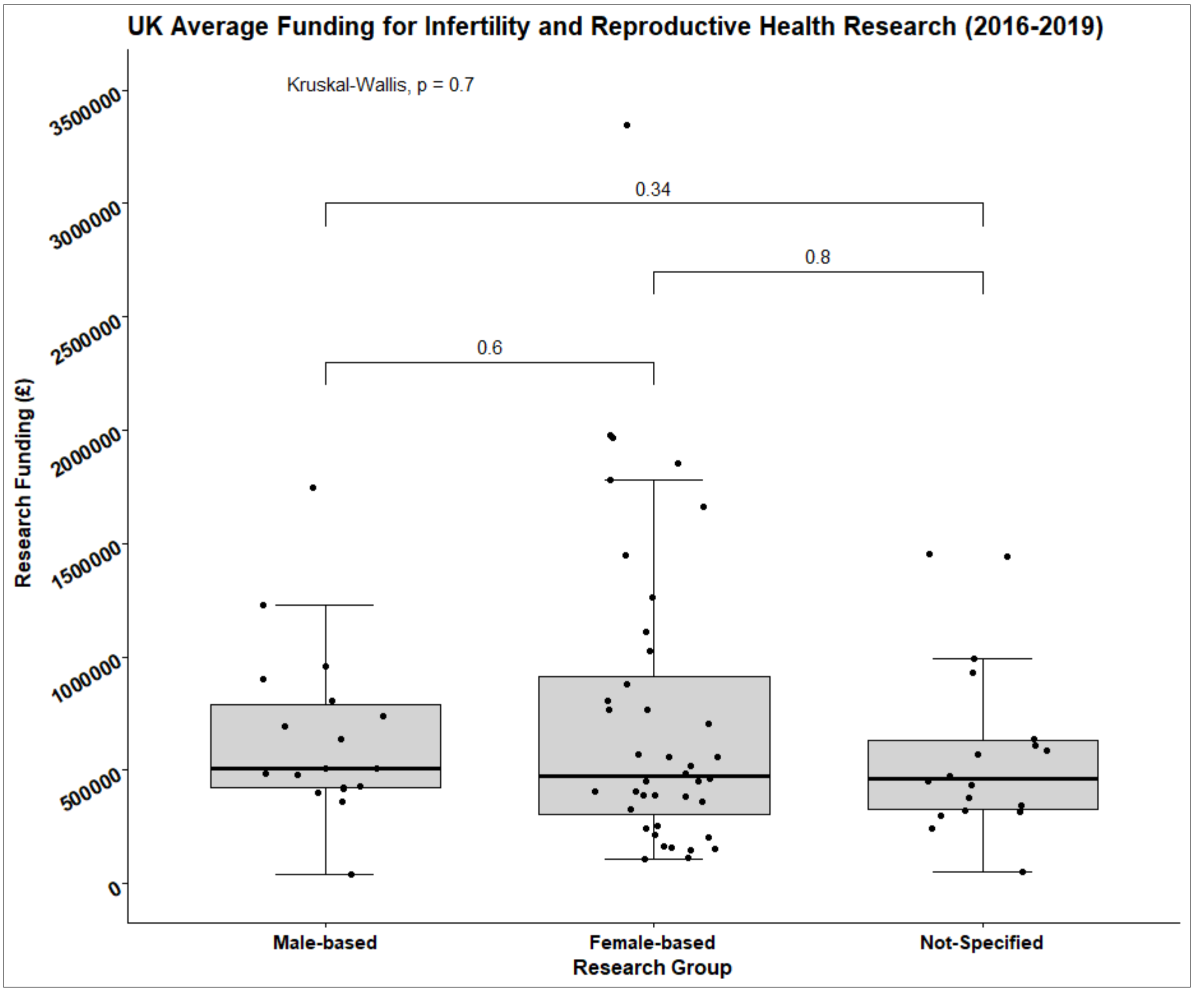
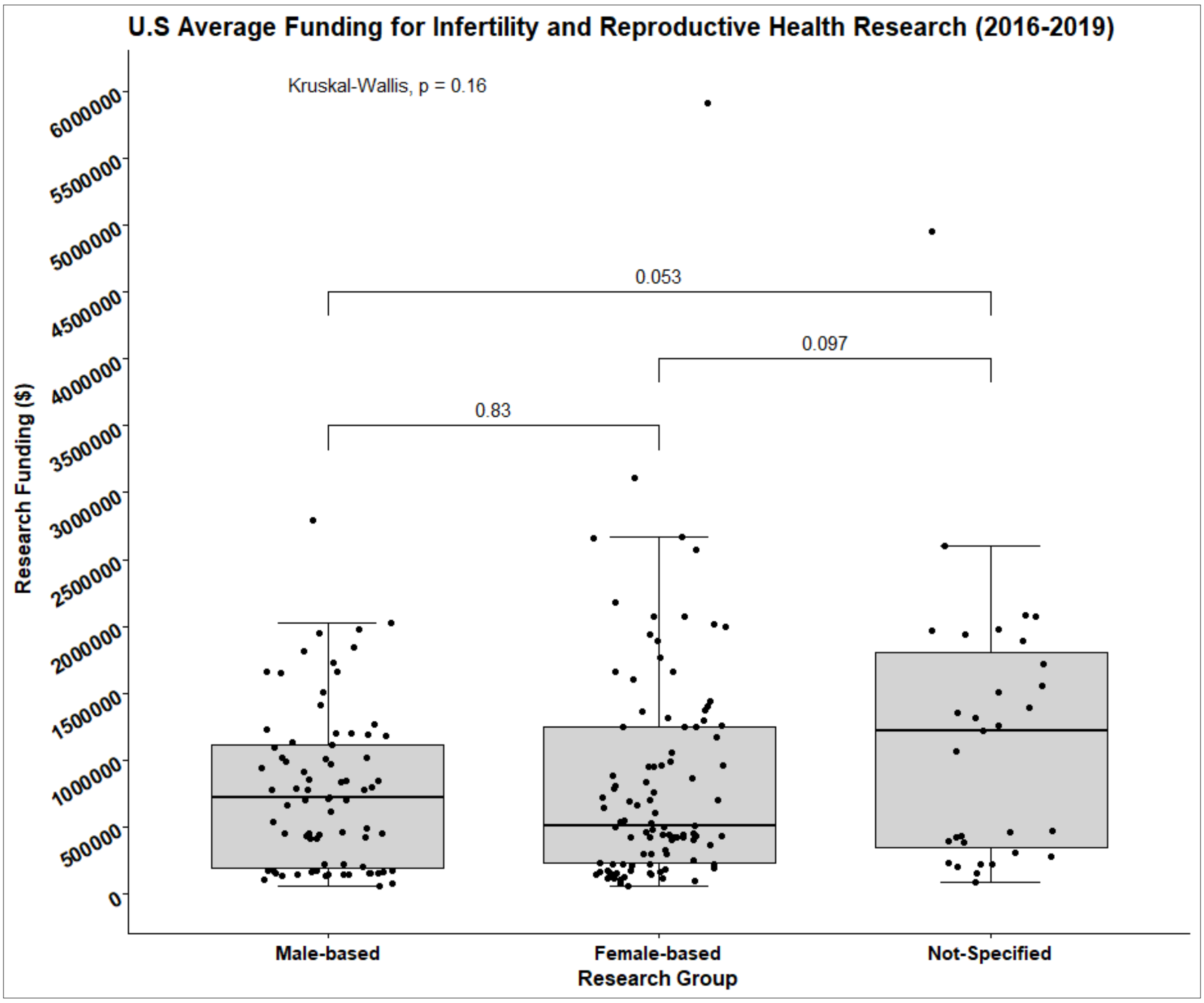


Figure 2: Box-and-whisker plot has a 95% CI of the funding collected for US infertility and reproductive health research under the three research focus categories: male-based, female-based, and not-specified. 76 projects were funded for male-based, 99 projects for female-based, and 31 for not-specified group by the NIH agencies.



404 **Abbreviations List:**

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Abbreviations for Funding Agencies/Institutes, Research Councils, and Databases	
BBSRC	Biotechnology and Biological Sciences Research Council
EPSRC	Engineering and Physical Sciences Research Council
HRCS	Health Research Classification System
MRC	Medical Research Council
NCCIH	National Centre for Complementary and Integrative Health
NERC	Natural Environment Research Council
NIA	National Institute of Aging
NIAAA	National Institute on Alcohol Abuse and Alcoholism
NIAID	National Institute of Allergy and Infectious Diseases
NIBIB	National Institute of Biomedical Imaging and Bioengineering
NICHD	National Institute of Child Health and Health Development
NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases
NIEHS	National Institutes of Environmental Health Sciences
NIGMS	National Institute of General Medical Sciences
NHBLI	National Heart, Blood, Lung Institute
NIH	National Institutes of Health
NIHR	National Institute of Health and Research
NINR	National Institute of Nursing Research
NIOSH	National Institute for Occupational Safety and Health
OD	NIH's Offices of the Director
RCDC	Research, Conditions and Diseases Categories
RePORT	Research Portfolio Online Reporting Tools
UKRI	UK Research and Innovation
UKRI-GTR	UK Research and Innovation – Gateway to Research

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Main Tables

Research Funding for Male Infertility and Male Reproductive Health in the UK and USA [2016 – 2019]

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MAIN TABLES

Table I: Total funding awarded by the UKRI and NIHR agencies for infertility research groups along with annual allocated funding.

Funding Period	Funding Agency	Total Funding for Research Grants and Fellowships (£000)*	Research Groups		
			Male-based (£) [N]	Female-based (£) [N]	Not-Specified (£) [N]
2015/16	BBSRC	330,473	0	0	0
	EPSRC	691,280	0	0	0
	MRC	487,157	1,748,922 [1]	3,346,448 [1]	0
	NIHR	268,000	0	214,625 [1]	0
2016/17	BBSRC	331,062	1,328,455 [3]	0	695,839 [2]
	EPSRC	733,188	958,032 [1]	0	0
	MRC	341,630	676,826 [2]	3,259,734 [6]	1,444,459 [1]
	NERC	190,519	0	0	51,390 [1]
	NIHR	263,300	0	1,027,318 [1]	0
2017/18	BBSRC	348,808	359,758 [1]	359,772 [1]	1,042,358 [2]
	EPSRC	844,134	694,461 [1]	0	244,593 [1]
	MRC	325,164	903,026 [1]	1,287,441 [2]	636,510 [1]
	NERC	220,618	0	0	0
	NIHR	274,000	477,541 [1]	2,140,292 [3]	0
2018/19	BBSRC	**1,439,505****	934,840 [2]	1,719,275 [4]	2,276,094 [4]
	EPSRC/ UKRI		0	252,693 [1]	0
	MRC		0	5,535,724 [7]	437,695 [1]
	NIHR	269,600	507,909 [1]	165,595 [1]	1,333,890 [2]
2019/20	BBSRC	**1,401,130****	1,139,195 [2]	779,165 [2]	0
	EPSRC/ UKRI		1,230,976 [1]	766,542 [1]	1,455,327 [1]
	MRC		807,249 [1]	1,564,917 [4]	323,754 [1]
	NERC		0	0	611,514 [1]
	NIHR	321,200	0	7,431,405 [5]	0
Total Funding (£)			**11,767,190 [18]**	**29,850,945 [40]**	**10,553,423 [18]**

Table I Values collected are rounded to the nearest £ Sterling pound. [N] refers to the number of projects awarded. *Total funding for research grants and fellowships (in millions) by the respective UKRI councils and NIHR were determined by consulting their public annual budgeting reports; **As of the funding period 2018/19 and onwards, all UKRI councils report their annual expenditures as one, therefore the annual expenditure for research and innovation were obtained from the UKRI's annual reports.

Table II: Summary of the UK Awarded Research by the UKRI and NIHR

	Research Group		
	Male-based [N=18]	Female-based [N=40]	Not-Specified [N=18]
Total (£)	11,767,190	29,850,945	10,553,423
Mean (SD)	653,733 (384,131)	746,274 (690,065)	586,301 (387,951)
Median (IQR)	507,197 (423,630-789,793)	476,163 (308,001-914,762)	463,394 (328,457-630,261)

Table II: All values are rounded to the nearest £ Sterling pound. SD, standard deviation of the data group; IQR, interquartile range which encompasses 50% of the data group.

Table III: The UK Proportion of Funding for Infertility Research

Funding Period	UK Agency	Total Research Grants and Fellowships (£)	Total Funding Proportion for Infertility Research (%)	Male-based Funding Proportion (%)	Female-based Funding Proportion (%)	Not-Specified Funding Proportion (%)
2015/16	MRC	487,157,000	1.05	0.36	0.69	0
	NIHR	268,000,000	0.08	0	0.08	0
2016/17	MRC	341,630,000	1.58	0.2	0.95	0.42
	NIHR	263,300,000	0.39	0	0.39	0
2017/18	MRC	325,164,000	0.87	0.28	0.4	0.19
	NIHR	274,000,000	0.96	0.17	0.78	0
2018/19	NIHR	269,600,000	0.74	0.19	0.06	0.49
2019/20	NIHR	321,200,000	2.31	0	2.31	0
Total	NIHR	1,396,100,000	0.87	0.07	0.79	0.1

Table III: The estimated proportion of funding for the UK was calculated using the data collected from Table 1. The proportions are rounded two 2 decimal points. The total research grants and fellowship values were obtained from the respective UK agency's annual reports and budgets. The MRC total research grants and fellowships from 2018/19 – 2019/20 were excluded as they are part of the UKRI and report their annual expenditures under one with other research councils, therefore the exact sum for research grants and fellowships for MRC was not available. The total funding proportion is only looking at NIHR funding from 2015/16 to 2019/20.

Table IV: Current Total Funding for Infertility Research Awarded by the NIH's funding institutes and the respective fiscal years.

Fiscal Year	NIH's Funding Institutes & Centres	Total Funding for Research Grants ($)*	Research Groups		
			Male-based ($) [N]	Female-based ($) [N]	Not-Specified ($) [N]
2016	NCCIH	107,447,348	0	1,439,100 [1]	0
	NIAID	2,983,260,567	0	2,219,320 [2]	0
	NICHD	1,021,132,045	4,927,677 [7]	5,183,197 [8]	6,573,877 [4]
	NIDDK	1,580,485,601	0	95,610 [1]	0
	NIEHS	407,288,463	1,784,198 [4]	3,890,638 [6]	233,712 [1]
	NIGMS	2,231,411,724	4,822,891 [3]	0	8,085,074 [5]
2017	NHBLI	2,463,498,743	0	2,568,489 [1]	0
	NIA	1,708,012,380	536,946 [1]	0	0
	NIAAA	342,212,488	0	0	398,788 [1]
	NICHD	967,265,488	12,430,159 [15]	13,078,769 [14]	7,325,909 [5]
	NIEHS	1,638,513,361	1,841,716 [1]	2,076,388 [1]	1,829,137 [2]
	NIGMS	411,526,579	2,831,714 [3]	3,105,261 [1]	2,776,900 [2]
2018	NIA	2,053,235,620	0	118,485 [1]	0
	NIAID	3,339,613,240	0	868,774 [1]	0
	NICHD	1,028,491,002	8,755,795 [13]	17,441,843 [19]	2,396,625 [5]
	NIDDK	1,613,382,619	0	0	85,224 [1]
	NIEHS	458,275,648	4,412,912 [3]	3,443,045 [4]	1,943,533 [1]
	NIGMS	2,506,055,218	2,537,197 [3]	3,231,516 [3]	1,971,230 [1]
	NIOSH	Unavailable**	169,500 [1]	0	0
2019	NIAID	3,496,548,418	0	2,668,689 [1]	0
	NIBIB	381,987,928	0	0	1,259,032 [1]
	NICHD	1,099,202,749	8,395,362 [16]	18,668,208 [31]	0
	NIEHS	454,787,252	1,095,907 [1]	1,792,109 [2]	0
	NIGMS	2,558,317,976	2,364,252 [3]	888,154 [1]	1,064,618 [1]
	NINR	129,862,737	0	495,303 [1]	0
	OD	594,535,751	1,505,963 [1]	0	0
2020	NICHD	1,133,572,974	0	0	218,250 [1]
	NIEHS	466,088,243	845,557	0	0

[1]

Current Total Funding ($)	59,257,746 [76]	83,272,898 [99]	36,161,909 [31]

Table IV: Values collected are rounded to the nearest US $ dollar. [N] refers to the number of projects awarded. From the start of data collection to the analysis, 7 projects changed their statuses from active to completed, making 138 projects out of 206 as active running. 67 of the 138 projects do not provide complete funding sums by the NIH, therefore, the funds were totalled up to their most recent awarding FY. *The values for the annual spending of research grants by the NIH (in millions) was found in the NIH's RePORT Funding site: The Research Grants: Awards and Total Funding, by type and Institute/Centre. **The values were not made available by the NIH.

Table V: Summary Statistics of the US Awarded Research by the NIH

	Research Group		
	Male-based [N=76]	Female-based [N=99]	Not-Specified [N=31]
Current Total ($)	59,257,746	83,272,898	36,161,909
Mean (SD)	779,707 (594,203)	841,140 (862,707)	1,194,687 (1,046,679)
Median (IQR)	718,541 (193,449-1,117,370)	511,781 (227,847-1,246,408)	1,223,600 (388,397-1,891,778)

Table V: All values presented are rounded to the nearest US dollar and produced using RStudio.

Table VI: The Current Total NICHD Proportion of Funding for Infertility Research

Fiscal Year	NIH Agency	Total Research Grants and Fellowships ($)	Total Funding Proportion for Infertility Research (%)	Male-based Funding Proportion (%)	Female-based Funding Proportion (%)	Not-Specified Funding Proportion (%)
2016	NICHD	1,021,132,045	1.63	0.48	0.51	0.64
2017	NICHD	967,265,488	3.39	1.29	1.35	0.75
2018	NICHD	1,028,491,002	2.78	0.85	1.7	0.23
2019	NICHD	1,099,202,749	2.46	0.76	1.7	0
Total	NICHD	4,116,091,284	2.56	0.83	1.32	0.4

Table VI: The estimated proportion of funding for the US was calculated using the data collected from Table 4. FY2020 was excluded as only one project was awarded between 1st October to 31st December 2019 and would be unreflective of the funding proportion for this year. The total proportion looks at the total funding provided by the NICHD for infertility research from 2016 to 2019 and the total research funding granted by the NICHD. The annual research grants and fellowship values were obtained from the NIH's RePORT Budget and Spending site: The Research Grants: *Awards and Total Funding, by type and Institute/Centre.*

Supplementary Materials

Research Funding for Male Reproductive Health and Infertility in the UK and USA [2016 – 2019]

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Supplementary Tables:

Supplementary Table I: Search filters used for respective databases

Search Filters	UKRI – GTR	NIHR – Open Data	NIH – RePORT Query
Project Start Year/Date	2016; 2017; 2018; 2019	2016; 2017; 2018; 2019	>=01/01/2016
Research Type Or Program Type	Research Grants; Fellowships	Research; Training	Research Projects Grants; Training, Individual; Training, Institutional*
Limit Project search to**	N/A	N/A	Project Title Project Terms Project Abstracts
Fiscal Year (FY)	N/A	N/A	No FY was selected
Funder Or Agency/Institute/Centre	None Chosen	N/A	Check All

Supplementary Table I - N/A – not applicable to the database used or not an available search filter. *Training, institutional is the support of research training programs within the research areas and priorities supported by the Institute to train predoctoral and/or postdoctoral fellows of an institution. ** 'Limit Project search to' is a feature of the NIH RePORTER Query system that searches the inputted search terms at the following options: project title, terms, and abstracts.

Supplementary Table II: Inclusion criteria for type of projects included into the data collection.

Male-focused infertility research	Female-focused infertility research	Not-specified infertility research
Spermatogenesis research	Oogenesis research	Gametogenesis and infertility
Sperm maturation, motility, and quality analysis research	Menstruation/menstrual cycle abnormalities	EDCs impacting general fertility
Sperm dysfunction/disorders research	Uterine and Ovarian disorders (*e.g., Endometriosis, Polycystic Ovarian Syndrome, and Uterine Fibroids*)	Underpinning the aetiology of infertility (*not specifying the focus group*)
Testicular and Prostate health (not cancer) research	Female contraception research development	Contraception development in conjunction with HIV/STI prevention
Male contraception research development	Maternal factors associated with ART outcomes	Studies using animal and insect models to further the understanding of **human** infertility and contraception development
Paternal factors associated with ART outcomes	EDCs association with female infertility	Hormonal dysregulation
Paternal association with fetus health/development (i.e., male infertility affecting fetus health/development)	Underpinning the aetiology of female infertility	Cell/embryonic development dysregulation giving rise to infertility
EDCs giving rise to male infertility	Hormonal dysregulation and female infertility	
Underpinning the aetiology of male infertility		
Hormonal dysregulation and male infertility		

Supplementary Table II – The inclusion criteria for the 3-research groups after examining abstracts, research impacts and public health relevance statements. Under each heading are the topics or field of research of reproductive health and infertility research.

Supplementary Table III: Type of projects that would be excluded from the data collection if the following were indicated as the primary research focus detailed in their abstracts and impacts, and example of few exceptions to include.

Primary Research Focus	Reasons for Exclusion	Exceptions to include
Research focusing on reproductive cancers (*e.g., ovarian, prostate, testicular, uterine…)* or other cancers	People who have cancers and are undergoing cancer treatments can negatively impact their fertility. Funding for cancer research goes away from focusing on infertility funding	If the project is investigating a concern that affected human fertility in addition to potentially causing cancers, they would be included.
Research focusing on STIs (*e.g., Chlamydia trachomatis* or *Gonorrhea)*	STIs are known to affect human fertility, but are usually funded under the category of infectious diseases rather than reproduction and infertility	A study focusing on STIs would be included only if it is contraceptive development in conjunction to STI prevention
Research focusing on HIV and/or AIDs	HIV/AIDS are known to affect human fertility, but are usually funded under the category of infectious diseases and impact the immune system	A study researching HIV or AIDs would be included only if it is contraceptive development in conjunction to HIV/AIDs prevention
Pregnancy/gestation; pregnancy health. Placental development Childbirth and Labor.	These areas were not included as comparison was primarily aimed at examining male infertility. Work on pregnancy and fetus are more tangential to work on infertility research and creates a wider scope.	A study focusing on this area of research would be included if it were investigating a paternal contribution to implantation and clinical pregnancy outcomes
Research focusing on fetus health or development		A study focusing on this area of research would be included if it were investigating a paternal or maternal contribution to the fetus' health, development, or future reproductive health, with or without the usage of ART.
Research focusing on miscarriages		A study focusing on miscarriages would be included if it were investigating an association between miscarriages and paternal or maternal infertility, with or without the usage of ART.
Research focusing on the sociological, policy or economic studies for infertility, or a public intervention program study	These research areas stray away from research focusing primarily on human infertility and reproductive health.	
Research focusing on animal, insect or plant infertility that are not used as model for human infertility research		

Supplementary Table III - Type of projects that would be excluded from the data collection if the following were indicated as the primary research focus detailed in their abstracts and impacts, and few exceptions to include them.

Supplementary Table IV: UK funding awarded across the funding periods from January 2016 to December 2019

Funding Period	**Research Groups**		
	Male-based (£) [mean]	Female-based (£) [mean]	Not-Specified (£) [mean]
2015/16	1,748,922*	3,561,073 [1,780,534]	0
2016/17	2,963,313 [522,539]	4,287,052 [562,710]	2,191,688 [547,922]
2017/18	2,434,786 [580,108]	3,787,505 [631,251]	1,923,461 [480,865]
2018/19	1,442,749 [480,917]	7,673,287 [590,253]	4,047,679 [578,240]
2019/20	3,177,420 [794,355]	10,542,029 [878,502]	2,390,595 [796,865]
Total	11,767,190	29,850,945	10,553,423

Supplementary Table IV – The UK funding across the 5 consecutive funding periods awarded between January 2016 to December 2019. The values are rounded to the nearest Sterling pound. *Value belongs to a single project awarded, thus, no mean was produced.

Supplementary Table V: US Current Funding across the 5 fiscal years from January 2016 to December 2019

Fiscal Year	Research Groups		
	Male-based ($) [mean]	Female-based ($) [mean]	Not-Specified ($) [mean]
2016	11,534,766 [823,912]	12,827,865 [712,659]	14,892,663 [1,489,266]
2017	17,640,535 [882,027]	20,828,907 [1,225,230]	12,330,734 [1,233,073]
2018	15,875,404 [793,770]	25,103,663 [896,559]	6,396,612 [799,574]
2019	13,361,484 [636,261]	24,512,463 [680,902]	2,323,650 [1,161,825]
2020*	845,557	0	218,250
Current Total	59,257,746	83,272,898	36,161,909

Supplementary Table V – The US current funding for projects awarded funding beginning between January 2016 to December 2019. The values are rounded to the nearest US dollar. *For 2020, male-based and not-specified groups were each awarded 1 project since the beginning of the FY (October 1st to December 31st, 2019), thus, no mean or median was produced.

Supplementary Table VI – Research Project Titles from UK Funding Agencies

Research Group	Project Reference	Research Study Title
Female-based	PB-PG-0815-20009	A mixed methods evaluation of online provision of oral contraceptives to measure: validity of self-reported biometric data; essential information transfer and user experience of self-measurement and submission of biometric data.
Not-Specified	BB/S001255/1	A novel mechanism underlying GnRH pulse generation by KNDy neurones
Not-Specified	BB/S000550/1	A novel mechanism underlying GnRH pulse generation by KNDy neurones
Female-based	15/113/01	A randomised controlled trial to determine the effectiveness of bridging from emergency to regular contraception: The 'Bridge-it' study
Female-based	II-LB-0715-20003	A trial of egg recovery rates for IVF using a collection chamber that provides environmental control: Eggcell Trial.
Female-based	MR/N024524/1	Androgens and women's health: developing new therapies to treat endometrial disorders
Male-based	MR/N002970/1	Androgens: unlocking the key drivers of male health and wellbeing
Female-based	EP/R041407/1	Born Slippy: A Tribological Discourse on Hysterosalpingography as a Therapeutic Treatment for Infertile Women
Male-based	BB/S000801/1	Building a molecular machine: analysis of co-chaperones for assembly of ciliary dynein motor complexes
Not-Specified	BB/P022065/1	Can histone code-like 'switches' govern the multi-functionality of RNA-binding proteins?
Female-based	MR/N023692/1	Can norethisterone enanthate (NET-EN) reduce the risk of recurrent bacterial vaginosis in women at high risk for HIV infection?
Female-based	MR/S036350/1	Cell atlas of the human female reproductive system across the lifespan
Female-based	17/60/22	Chronic Endometritis and Recurrent Miscarriage - The CERM trial
Female-based	PB-PG-0817-20046	Chronic endometritis and unexplained recurrent miscarriage: the role of the endometrial microbiome.
Female-based	MR/N011147/1	Community pharmacist provision of contraception services for women receiving opiate substitution treatment
Female-based	BB/P003435/1	Co-ordinated regulation of ovarian follicle assembly by Activin A and FoxL2
Female-based	PB-PG-0317-20018	CRESCENDO Creating a Clinical Prediction Model to predict Surgical Success in Endometriosis
Not-Specified	MR/S023712/1	Crowdsourcing with adolescents in Senegal to address social norms limiting their access to sexual and reproductive health services
Not-Specified	BB/N006933/1	Cytoplasmic dynein and KASH5: partners in fertility
Female-based	BB/R015961/1	Decoding the role of follicle stimulating hormone in ovarian ageing
Female-based	BB/R015961/2	Decoding the role of follicle stimulating hormone in ovarian ageing
Male-based	BB/R003556/1	Defining the impact of paternal nutrition on fetal growth regulation
Not-Specified	EP/R041814/1	Engineering Novel Imaging Technologies for Reproductive Health: Transforming IVF outcomes
Not-Specified	NE/P010911/1	Environmental determinants of IVF treatment
Female-based	MR/S000437/1	Epigenome patterning in oocytes and its legacies in the embryo

Female-based	MR/R003246/1	Exploration of the oogenic potential of putative germ line stem cells isolated from the ovaries of girls and adult women
Male-based	BB/N009886/1	FSTL3: A Crucial Regulator of Sertoli Cell Proliferation
Male-based	BB/S007407/1	Function and structure of specialised ribosomes in the testis
Female-based	MR/S025235/1	Gonadotropin action in the polycystic ovary
Female-based	MR/S037608/1	Harnessing cross-country administrative data to evaluate national policy impacts on maternal, infant and child health and health inequalities-MatCHNet
Male-based	BB/N007026/1	How does pituitary androgen signalling support lifelong health and wellbeing? An integrated transgenic and systems biology approach
Male-based	MR/P009948/1	Human germline in vitro models for development and the epigenetic program
Female-based	BB/R015635/1	Identification of human-specific regulatory mechanisms in female germ cell development
Female-based	MR/S002456/1	Identifying disease promoting macrophages and tissue-identity in endometriosis
Female-based	MR/S002456/2	Identifying disease promoting macrophages and tissue-identity in endometriosis
Male-based	BB/P006612/1	Identifying the functions of a family of nuclear RNA binding proteins that switch expression between somatic and meiotic cells
Male-based	MR/P02419X/1	IMPC: Importance of PABPs in mammalian reproduction and physiology
Female-based	MR/P011454/1	Improving adolescent access to contraception and safe abortion in sub-Saharan Africa: health system pathways
Not-Specified	CS-2018-18-ST2-002	Improving the evaluation and treatment of patients with reproductive disorders using kisspeptin
Not-Specified	BB/R002703/1	Interrogating the potential of mouse primordial germ cells in vivo
Female-based	II-LB-0715-20002	Intra-Uterine SENSing using a battery-less, wireless intrauterine platform (U-SENSE)
Not-Specified	MC_EX_MR/S015930/1	Investigating retrotransposon-driven gene expression programmes in early development
Female-based	17/116/01	Letrozole or Clomifene, with or without metformin, for ovulation induction in women with polycystic ovary syndrome: a 2x2 factorial design randomised trial (The LOCI trial)
Female-based	15/143/01	Medical treatment of heavy menstrual bleeding in primary care: Long term follow up of ECLIPSE trial cohort
Female-based	MR/P020283/1	Menstrual health interventions and school attendance in Uganda (MENISCUs-2)
Female-based	MR/P00265X/1	MICA: CB2 agonists as a novel treatment for women with endometriosis-associated pain
Male-based	EP/P013651/1	Modelling sperm-mucus interactions across scales
Male-based	MR/S021248/1	MOLECULAR MECHANISMS OF MEIOTIC RECOMBINATION
Not-Specified	MR/N022556/1	MRC Centre for Reproductive Health at the University of Edinburgh
Female-based	MR/M009238/2	Neuroinflammation in endometriosis: macrophages behaving badly?
Female-based	MR/R013454/1	Novel methods for optimising health systems payment for performance interventions to improve maternal and child health in low-resource settings
Male-based	BB/P001564/1	Nucleosome positioning and transcriptional regulation in Drosophila differentiated cells

Male-based	MR/P011799/1	Paternal obesity-associated DNA methylation: an investigation into its reproducibility, reversibility and association with fetal growth restriction
Female-based	EP/S031561/1	Peptide-mimetic hydrogels as a long-acting multipurpose drug delivery platform for combined contraception and HIV prevention
Female-based	MR/N006089/1	Point-of-care testing and treatment of sexually transmitted infections to improve pregnancy outcomes in resource-limited, high-burden settings
Male-based	MR/S017151/1	Protecting spermatogonial stem cells from chemotherapy-induced damage for fertility preservation in childhood cancer
Female-based	MR/R022194/1	Puberty health interventions to improve menstrual health and School attendance among Gambian adolescents (MEGAMBO).
Male-based	EP/N021096/1	Rapid Sperm Capture
Female-based	NIHR127280	Recurrence of Endometriosis: a randomised controlled trial of clinical and cost effectiveness of Gonadotrophin Releasing Hormone Analogues with add back hormone replacement therapy versus repeat Laparoscopic surgery (REGAL trial)
Female-based	MR/R008574/1	Regulation of meiotic chromosome segregation by post-translational modifications
Not-Specified	16/95/01	REMEDY: Randomised Evaluation of Management of sExual DYsfunction
Not-Specified	BB/N018680/1	Sex-determining mechanisms in the chick
Not-Specified	BB/N018672/1	Sex-determining mechanisms in the chick
Not-Specified	MR/P011535/1	Sex-specific disease aetiology from developmental steroid insults: mechanistic understanding and biomarker development towards disease prevention.
Female-based	NIHR128137	STOP-OHSS (Shaping and Trialling Outpatient Protocols for Ovarian Hyper-Stimulation Syndrome): A feasibility study and randomised controlled trial, with internal pilot, to assess the clinical and cost-effectiveness of earlier active management of OHSS
Not-Specified	MR/N000188/1	Structures and mechanism of BRCA2 in meiotic recombination
Male-based	PDF-2017-10-098	Targeted caloric restriction to improve sperm quality in obese men with infertility
Male-based	17/68/01	Testosterone Effects and Safety in Men with Low Testosterone levels (TESTES): An evidence synthesis and economic evaluation
Not-Specified	BB/S003681/1	The Flux Capacitor: How mitochondria modulate metabolic flux and gene expression
Female-based	BB/T001542/1	Understanding hyaluronan crosslinking mechanisms in ovulation and inflammation: CryoEM structural and interaction analysis of HC-HA/PTX3 complexes
Female-based	BB/T001631/1	Understanding hyaluronan crosslinking mechanisms in ovulation and inflammation: CryoEM structural and interaction analysis of HC-HA/PTX3 complexes
Not-Specified	NE/S011188/1	Understanding the role of selection at the gametic level in adaptation to changing environments
Female-based	BB/S002995/1	Unravelling the causes of declining uterine function with age
Male-based	BB/S008039/1	Why is the highly conserved splicing regulator protein Tra2b essential for spermatogenesis?
Female-based	MR/N015177/1	Women's reproductive health and its relation to diabetes and cardiovascular health.
Female-based	MR/N015177/2	Women's reproductive health and its relation to diabetes and cardiovascular health.

Female-based	PB-PG-0815-20009	A mixed methods evaluation of online provision of oral contraceptives to measure: validity of self-reported biometric data; essential information transfer and user experience of self-measurement and submission of biometric data.
Not-Specified	BB/S001255/1	A novel mechanism underlying GnRH pulse generation by KNDy neurones
Not-Specified	BB/S000550/1	A novel mechanism underlying GnRH pulse generation by KNDy neurones
Female-based	15/113/01	A randomised controlled trial to determine the effectiveness of bridging from emergency to regular contraception: The 'Bridge-it' study

Supplementary Table VI – Research project titles from the UKRI and NIHR (UK) funding agencies. Some projects titles are repeated; however they would have separate grants awarded with different project IDs. Further information on each research project can be found in the UKRI and NIHR Dataset_EG_CDJ_CLRB.

Supplementary Table VII – Research Project Titles from US Funding Agencies

Research Group	Project Reference	Research Study Title
Female-based	1R01HD100318-01	3/4: Pre-IVF Treatment with GNRH Antagonist in Women with Endometriosis - A prospective double blind placebo controlled trial (PREGNANT)
Male-based	1R03HD087429-01A1	A genome-wide drosophila RNA1 screen for regulators of centrosome reduction
Male-based	1R21HD092828-01	A home-based, rapid, sensitive semen analyser
Female-based	1R01ES026964-01	A longitudinal study of endocrine disrupter mixtures and reproductive aging
Female-based	1R21HD090242-01	A mouse model to demonstrate the impact of myometrial FSHR on fertility
Female-based	1R01ES028923-01A1	A preconception cohort study of air pollution, fertility, and miscarriage
Not-Specified	1F32HD095620-01	A role for hypothalamic melanocortin 3 receptors in integrating energy state with reproductive physiology
Male-based	5R01HD091068-03	A system for culturing mammalian spermatogonial cells
Male-based	1R01HD095841-01	Accumulation, storage, and release of sperm in the oviduct
Male-based	1R01HD098039-01	ALDH1A/A2 inhibitors for male contraception
Male-based	1R61HD099743-01	Allosteric cdk2 inhibitor discovery and development for male contraception
Female-based	1F32HD090854-01A1	An ovary-on-a-chip for understanding early folliculogenesis and reproductive toxicology in a large mammalian model
Female-based	1U54HD096957-01	Antibody-based contraceptive MPTS: preclinical and clinical research
Male-based	1F31HD089693-01A1	Assessing microenvironment and endothelial cell instruction of testis function
Female-based	1R01HD096266-01	Biological role of uterine glands in pregnancy
Not-Specified	275201500002I-4-27500002-1	Biological testing facility - maintenance of existing non-human primate colony
Female-based	1R01AT008824-01A1	Botanicals derived progestins and their impact on women's health
Male-based	1R01HD096745-01A1	Calcium signaling nanodomains in sperm motility and fertility
Not-Specified	1R44HD097063-01	Capsule-intravaginal ring for sustained release of antibodies for non-hormonal contraception and vaginal protection against HIV
Not-Specified	1R35GM118066-01	Causes and consequences of aneuploidy
Female-based	1R01HD092550-01	Causes and consequences of mitochondrial dysfunction in oocytes and cumulus cells
Female-based	275201300019I-0-27500005-1	CCTN-pharmacokinetic/pharmacodynamic evaluation of levonorgestrel butanoate for female contraception
Male-based	1R15HD096759-01A1	Cell-type specific inactivation of sumoylation during mouse spermatogenesis
Male-based	1F32HD086986-01	Chromatin dynamics, transcriptional activators and repressors in transition from proliferating progenitors to terminal differentiation during adult stem cell differentiation
Female-based	1R01GM123048-01A1	Chromatin expulsion by the DNA replication licensing factor orc4 during asymmetric cell division in meiosis and differentiation
Male-based	1R01GM123643-01	Circumventing the blood-testis barrier
Female-based	1F30HD085652-01A1	Compartmental adrenomedullin signalling in the uterus during implantation

Male-based	1R21HD090371-01A1	Comprehensive mapping of mouse testis cell types and spermatogenic stages by single-cell rna sequencing
Male-based	1R01GM127379-01A1	Control of spermatogonial stem cell formation
Female-based	1R61HD099750-01	Copper intravaginal contraception
Not-Specified	1R21HD098621-01A1	Correction of endocrine disruptor-induced transgenerational epimutations by CRISPR-DCAS9
Male-based	1P01HD087157-01A1 8120	Crispr/cas9 and Small Molecules for Targeting Sperm Function and Fertilization
Male-based	1R01GM123512-01A1	Deciphering Pachytene piRNA Function
Male-based	1R03HD093990-01A1	Defining Mechanisms of Pp1 Phosphatase Specificity and Function Required for Male Fertility
Female-based	1F31HD097830-01	Defining the Neurophysiologic Mechanisms Engaged by Estradiol Feedback in Regulating Reproductive Neuroendocrine Function
Not-Specified	1R15HD084253-01A1	Defining the Novel Role for the Rna Binding Protein Etr-1 in C.elegans Gametogenesis
Male-based	1R01OD028223-01	Derivation of Functional Spermatogonia Stem Cells From Rhesus Macaque Ipscs
Male-based	1R01ES030942-01	Determining How Preconception Exposure to Phthalates Impacts Sperm Function, the
Female-based	1R21ES026454-01A1	Detrimental Effects on Female Reproduction of in Utero and Neonatal Exposure to Common Phthalates DEHP and Its Replacement DINP
Male-based	1R21HD092700-01	Developing an Animal Model to Identify the Role of the Sperm Centriole in Fertility
Female-based	1R61HD099742-01	Developing Modulators of the Sperm-specific Potassium Channel Slo3 for Contraception
Female-based	1R43HD094454-01A1	Development of a Biologic for Non-hormonal Contraception
Male-based	1R21HD083616-01A1	Development of a Zebrafish Model for Selenoprotein Synthesis and Function
Male-based	1R61HD099720-01	Development of Allosteric Hipk4 Inhibitors as Non-hormonal Male Contraceptives
Female-based	1R21HD092739-01	Development of New Therapeutic Strategies for Endometriosis
Not-Specified	1R56HD095629-01	Development of Novel Sperm-binding Antibodies
Not-Specified	1R01HD084380-01A1	Developmental Epidemiological Study of Children Born Through Reproductive Technology (Descrt)
Not-Specified	1R21ES024854-01A1	Dioxin and Estradiol Regulation of Proteins Through Cugbp2
Not-Specified	1R01GM121688-01	Dissecting the Origins of a Complex Reproductive Trait: Nematode Self Fertility
Male-based	1R43HD097820-01	Drug Interactions in Vitro for Ep055: a Non-hormonal Male Contraceptive
Female-based	1R01HD091848-01A1	Dynamic Regulation of the Ovarian Reserve
Male-based	1F32GM130006-01	Elucidating the Role of Small Rna Pathways in Heat-stress Induced DNA Damage During Spermatogenesis
Male-based	1F30HD097961-01	Elucidating the Role of Tcf21+ Mesenchymal Cells in Testis Tissue Homeostasis and Regeneration
Male-based	1R21ES026778-01A1	Embryonic Inheritance of Sperm Methylome After Adult Exposure to Phthalates
Female-based	1R01ES026998-01A1	Environmentally Relevant Phthalate Exposures and Ovarian Function
Male-based	1R01GM122776-01A1	Epigenetic Regulation of Gene Expression During Spermatogenesis
Male-based	1F32HD086939-01A1	Epigenetic Regulation of Histone Eviction in Spermatogenesis

Female-based	1F32HD095618-01	Epithelial Regeneration in the Adult Oviduct
Male-based	1F32HD097932-01A1	Examining the Androgenic and Progestational Effects of Novel Androgens for Male Contraception
Male-based	1R01HD094698-01A1	Exploring Vascular-mesenchymal Interactions in the Stem Cell Niche
Not-Specified	1R01HD089932-01A1	Fa DDR Pathway in Germ Line Integrity
Male-based	1R21HD094322-01	Feasibility of in-home Semen Testing in a North American Preconception Cohort Study
Female-based	1R03HD097262-01	Fertility Preservation in Women With Cystic Fibrosis Pre-lung Transplantation
Female-based	1R56HD086054-01A1	FSH and IGF1R Signaling Crosstalk in Ovarian GCS
Male-based	1R15GM126458-01	Functional Analysis of MicroRNAs in C.elegans Spermatogenesis
Male-based	1R01HD088412-01	Functional Analysis of Novel Testis-expressed Secreted and Transmembrane Proteins
Female-based	1R01ES029464-01A1	Functional and Epigenetic Effects of Preconceptional EDCs on the Female HPG Axis
Not-Specified	1P01HD087157-01A1	Functional Genomics and Dec-tec to Identify Germ Cell-specific Contraceptives
Male-based	1R01HD095341-01	Functional Genomics and Proteomics to Reveal Reproductive-tract Specific Proteins
Not-Specified	1R01GM117155-01	Functions of Polo-like Kinases During Mammalian Meiosis
Male-based	1R01ES030722-01A1	Genetic and Epigenetic Mechanisms of Infertility Caused by Endocrine Disrupting Chemicals
Female-based	1R01HD086175-01A1	Genetic Interrogation of Conserved Follicular Factors for Matrix Metalloproteinase Regulation and Ovulation
Female-based	1R21HD087427-01A1	Genetic Studies of the Kit Receptor Tyrosine Kinase in Primordial Follicle Activation
Female-based	1R01HD093778-01	Genetics and Genomics of the Ovarian Reserve and Female Fertility
Female-based	1R21HD087973-01	Genome-wide Identification of Genes Required for Decidualization
Female-based	1F31HD088053-01	Genotoxic Effects of L1 Retrotransposition Trigger Oocyte Elimination During MPI
Not-Specified	1R21AA024889-01A1	Germ Cell Mediated Epigenetic Memory of Ethanol Exposure
Female-based	4R00HD080742-03	Greb1 Action in Endometrial Function and Dysfunction
Male-based	1R21ES027117-01	Histone Lysine Crotonylation in Paternal Epigenetic Inheritance
Female-based	1R01HD093726-01	Homeostatic to Reactive Hyaluronan Matrices in Ovarian Reproductive Aging
Male-based	1R01ES025066-01A1	Human Pesticide Exposure and Epigenetic Changes in Sperm DNA
Male-based	1R03HD097433-01	Identification of Genetic Factors Contributing to Germline Stem Cell Maintenance
Male-based	1R21HD086839-01A1	Identification of Phospho-proteins Regulating Sperm Function
Not-Specified	1R01ES027921-01A1	Identity, Mechanisms and Early Life Impacts of Transporter Interfering Compounds
Not-Specified	1F32HD094500-01	Improving Bovine Cloning Efficiency by Enhancing Reprogramming During Embryonic Genome Activation (EGA)
Female-based	1R01HD089957-01	Improving Emergency Contraceptive Effectiveness in Obese Women
Male-based	1R01HD092084-01	Improving Fertility Preservation in Boys With Cancer
Not-Specified	1R01EB027099-01	In Vivo Analysis of Mammalian Fertilization

Female-based	1R61AI136008-01	Ind-enabling Preclinical Development of a Multipurpose Intravaginal Ring for the Prevention of Herpes, HIV and Unintended Pregnancy
Female-based	2R44AI124815-02A1	Ind-enabling Preclinical Development of a System for the Multipurpose Prevention of HIV and Unintended Pregnancy
Female-based	4R00NR017191-02	Influence of Diet, Iron Stores, and Toxic Metals on Uptakes and Effects on Uterine Fibroid Risk in African American Women
Female-based	1R41HD100190-01	Innovative 3d Printed Intravaginal Ring Anelleo-pro, the First Single Administration of Progesterone for Infertility
Female-based	1R21HD097601-01	Integrative Metabolism of Oocyte Development and Its Modulation by Maternal Diet
Female-based	1R21ES026282-01A1	Investigating Modes of Action of Glyphosate-induced Ovotoxicity
Male-based	1F31GM117971-01	Investigating the Functional Role of Zinc Fluxes During Sperm Activation
Female-based	5F31HD096838-01	Investigating the Role of an FSHB Enhancer in FSHB Expression and Polycystic Ovary Syndrome
Male-based	3R01HD091068-03S1	IPSC-derived Organoids to Study Testis Function
Male-based	1R03HD094046-01	Isolation of Viable Human Sperm From Failed Microsurgical Testicular Biopsies
Male-based	1R03HD099412-01	L1 Retrotansposition During Spermatogenic Failure
Female-based	1R01HD093671-01	Large-scale Studies in Emerge to Discover the Genetic Determinants of Uterine Fibroids
Male-based	1R03HD090315-01	Lifestyle and Psychosocial Determinants of Male Subfertility: a Prospective Study
Male-based	1R01HD084353-01A1	Linking Fertility-associated Gene Polymorphisms to Aberrant Sperm Phenotypes
Female-based	1R61AI142687-01	Long Acting Film Technology for Contraception and HIV Prevention (Latch)
Male-based	1R44HD099040-01	Low Cost, Automated Smartphone Based Assay for Semen Analysis
Male-based	1R44HD093493-01	Low-cost, Portable and Automated Semen Analysis Using Computational Microscopy for Home-based Testing of Male Wellness and Fertility
Male-based	1R35GM119458-01	Macrophage Regulation of the Spermatogonial Stem Cell Niche
Male-based	1R01ES028214-01	Male Preconception Phthalates and Offspring Embryo and Sperm Allele-specific Methylome Programming
Male-based	1P01HD087157-01A1 8121	Manipulation of Sperm-specific Proteases Using Genetic and Chemical Approaches
Female-based	1R35GM131810-01	Maternal Control of Germline Development
Not-Specified	1R35GM118092-01	Mechanism and Regulation of Meiotic Recombination
Not-Specified	3R01DK047320-22S2	Mechanism of Selenoprotein Synthesis
Female-based	1R01GM124519-01A1	Mechanisms Driving the Transition From Oocyte to Embryo: the Role of the mRNA Decay Activator Zfp36l2
Female-based	1F30HD100126-01	Mechanisms Linking Global Transcriptional Silencing and Zygotic Gene Activation During the Oocyte-to-embryo Transition in Mammals
Male-based	4R00HD081204-02	Mechanisms of a Novel Actin Related Protein in Male Gametes Ensuring Fertility
Not-Specified	1R01ES027487-01	Mechanisms of Memory of Environmental Exposure: Determining the Role of Histone Modifications in Regulating Transgenerational Behavior Effects Caused by Environmental Chemical Exposure.

Not-Specified	1R15HD095735-01	Mechanisms Underlying Telomere Function in Germ Cell Development
Female-based	1R03HD087528-01A1	Membrane Estrogen Receptor 1 Mediation of Epigenetic Effects of Estrogen
Male-based	1R01HD093827-01A1	Membrane Lipid Regulation of Calcium Channels in Sperm.
Female-based	1R01HD087402-01A1	Metabolic Events Controlling Ovarian Steroidogenesis
Female-based	1R01HD092263-01	Metabolic Regulators of Corpus Luteum Function
Male-based	1R01GM132490-01	Mitochondria-anchored Protein Complexes in piRNA Biogenesis and Function
Female-based	1F32HD095550-01	Modelling Human Embryonic Aneuploidy Using Pre-implantation Bovine Embryos
Female-based	1F30AG058387-01A1	Modelling Ovarian Ageing Phenotype in Mechanically Tuned 3d Matrices
Female-based	5F30DK108561-02	Molecular and Cellular Changes in the Peritoneal Surface Mesothelium During Adhesion Formation
Female-based	1R21HD094096-01	Molecular Identity of Maternal Regulators of the Egg to Embryo Transition
Male-based	1R03HD098314-01A1	Molecular Marker for Centriole Remodelling in Human Reproduction
Female-based	1R35GM122580-01	Molecular Mechanisms of the Maternal to Zygotic Transition
Female-based	1R43HD097720-01	Multi-center Prospective Study Assessing a Panel of MicroRNAs as a Non-invasive Test for Endometriosis
Female-based	1R01HD086100-01A1	Neuroendocrine Regulation of Reproduction by Glucocorticoids
Female-based	1R01HD097675-01A1	Neurotensin: a Novel Mediator of Ovulation
Female-based	1R61HD099747-01	Nonhormonal Contraceptive Intravaginal Ring Based on High Valency Anti-Sperm Antibody Constructs
Female-based	1R43HD097941-01	Non-hormonal Contraception Based on Vaginal Delivery of Multimeric Sperm-binding Antibodies
Female-based	1R03HD098441-01	Novel Reverse Genetics Approach to Probe Cytoskeletal Functions in Mammalian Oocytes
Male-based	1R01HD090007-01	Origin and Functional Significance of the Spermatogonial Stem Cell Transcriptome Barcode
Female-based	1R21HD094983-01	Oxygen as a Potential Regulator of Follicle Quiescence in the Primate Ovary
Female-based	1R03HD090624-01A1	P21-activated Kinase as Regulator of Actin and Microtubules in Mammalian Oocytes
Female-based	6R21HD080148-02	Parous Mouse: a Unique Model to Define Uterine Receptivity Versus Nonreceptivity
Male-based	1R01ES028298-01A1	Paternal Preconception Phthalates and Reproductive Health - Potential Mediation Through Sperm DNA Methylation
Female-based	1F32HD097939-01	Paxillin as a Mediator of Non-classical Androgen Receptor Actions in Ovarian Follicles
Not-Specified	5R01HD086478-03	Phenotyping Early Embryonic Lethal Knockout Mice to Identify Essential Genes With Previously Uncharacterized Roles in Pre-implantation Development, Gastrulation, Turning, and Placentation
Female-based	1K99ES028748-01	Phthalate-induced Ovulatory Dysfunction in Women
Female-based	4R00ES028748-03	Phthalate-induced Ovulatory Dysfunction in Women
Female-based	1R56ES025147-01A1	Phthalates and Ovarian Toxicity
Female-based	1R01ES028661-01A1	Phthalates and Ovarian Toxicity
Female-based	1R56ES025728-01A1	Placental Molecule Secretions Measured in Early Pregnancy Are Targets of Endocrine Disruption and Are Indicators of Sex-specific Fetal Development

Female-based	1R43HD097944-01	Plant-derived Molecular Condom as an on-demand Nonhormonal Female Contraceptive
Not-Specified	1R01HD083260-01A1	Postnatal Plasticity in the GNRH System
Female-based	1R43AI124815-01	Preclinical Development of a Multipurpose Intravaginal Ring for the Prevention of HIV and Unintended Pregnancy
Female-based	1R01HD100336-01	Pre-IVF Treatment With a GNRH Antagonist in Women With Endometriosis - a Prospective Double Blind Placebo Controlled Trial (Pregnant) - Application 1/4
Female-based	1R01HD100329-01	Pre-IVF Treatment With a GNRH Antagonist in Women With Endometriosis - a Prospective Double Blind Placebo Controlled Trial (Pregnant) - Application 4/4
Female-based	1R01HD100343-01	Pre-IVF Treatment With a GNRH Antagonist in Women With Endometriosis - a Prospective Double Blind Placebo Controlled Trial 2/3
Female-based	1R01HD099487-01	Primary Ovarian Insufficiency: Etiology and Comorbid Disease
Male-based	1R01HD095631-01	Project One: Development and Testing of Hca Ivr
Male-based	5R01HD095630-02	Project Three: Assessing Effects of Anti-CD52G MABS on STD Pathogens in Semen
Female-based	1R21HD091337-01	Prospective Randomized Trial of Tranexamic Acid Versus Levonorgestrel Intrauterine System for the Treatment of Heavy Menstrual Bleeding in Women With Uterine Fibroids
Female-based	1R01HD092499-01A1	Regulation of Ca2+ Influx in Mouse Oocytes and Eggs During Maturation and Fertilization to Improve Assisted Reproductive Technologies and Modulate Fertility
Not-Specified	1R01GM123556-01A1	Regulation of Developmental Potency by the Transposon Line1
Male-based	1R35GM118052-01	Regulation of Meiosis in Mice
Female-based	1R15HD099859-01	Regulation of Oocyte Development by Steroid Hormones
Not-Specified	1R01GM113001-01A1	Regulation of Sex-specific Gonad Stem Cell Niche Development by Doublesex
Male-based	1R03HD096176-01	Regulation of Sperm Metabolism and Fertility by Calcineurin and Gsk3
Male-based	1F31HD097928-01A1	Replication-independent DNA Methylation Dynamics During Post-Testicular Sperm Maturation
Male-based	1R01GM124024-01	Requirements for Cytosolic Chaperones in the De Novo Folding of Septin Proteins
Male-based	4R00ES025231-03	Retinoic Acid Signaling Disruption by Phthalates in Human and Rodent Fetal Testis
Male-based	1K99ES025231-01A1	Retinoic Acid Signaling Disruption by Phthalates in Human and Rodent Fetal Testis
Female-based	1R01HD098200-01	Reversible Contraception by Selective Silencing of GNRH-II
Female-based	1R01HD084478-01A1	Risk Factors for Early Pregnancy Loss
Male-based	1R01HD094546-01A1	Rna Pol II Pausing Is Critical for Spermatogenesis and Male Fertility
Not-Specified	1R01GM125800-01	Role of Chromosomally Tethered Proteasome in Chromosome Pairing and Meiotic Recombination
Not-Specified	1R01GM127569-01A1	Role of GCNA in Preserving Genome Integrity and Fertility
Female-based	1R01HD089495-01A1	Role of Neuroestradiol in Regulation of the GNRH Surge
Female-based	1R56HD093383-01A1	Role of the DNA Helicase LSH in Female Meiosis
Male-based	1R01HD093703-01A1	Role of the Extracellular Matrix During Wolffian/epididymal Duct Morphogenesis
Male-based	1R01HD094736-01A1	Roles of X- and Y-palindromic Genes in Mammalian Fertility
Female-based	1R44HD095724-01	Safety, and Acceptability of a Non-hormonal Vaginal Ring
Female-based	1R01HD097202-01A1	Salt-inducible Kinase Regulation of Ovarian Granulosa Cells

Female-based	1R01GM129478-01	Sexual Identity Maintenance in Drosophila Female Germ Cells
Female-based	1R44HD097750-01	Sirt1 and Bcl6: Dual Biomarkers of Endometriosis and Endometrial Receptivity
Not-Specified	1R01HD095628-01	Slo3 K Channel: a Novel Target for Contraception
Female-based	1R61HD099748-01	Smart Polymer Fibers for Tampon-like Nonsteroidal Contraceptive Devices
Not-Specified	1R15GM117548-01	Specification of Meiotic Cohesin Function by Divergent Alpha-kleisin Subunits
Male-based	1R44HD095355-01	Sperm Sample Preparation for Point of Care Applications
Female-based	1R21HD092009-01	Stem Cell-derived GNRH Neurons: Optimization and Characterization
Female-based	1R01HD088638-01	Study of Ovarian Aging and Reserve in Young Women (Soar)
Female-based	1R61HD099745-01	Synthetic mRNA-mediated Reversible Immunocontraception
Not-Specified	1K99ES025280-01A1	Systems Approach to Define AHR Ligand Toxicity on Reproductive System Development
Male-based	1P01HD087157-01A1 8119	Targeting Sperm-specific Proteins During Meiosis and Sperm Morphogenesis
Male-based	1R61HD099722-01	Targeting Testis-specific Ubiquitin-proteasome Pathways for Male Contraception
Female-based	1R01HL134840-01	Telomeres and Fecundity
Female-based	1R01HD097087-01	The Actions of Steroid Hormones on Oviduct Function
Male-based	1R01ES028712-01	The Effects of Environmental Exposures on Semen Quality and the Sperm Epigenome
Female-based	1R03HD095098-01	The Function of Progesterone Receptor in Human Ovulatory Follicles
Female-based	1F32HD098805-01	The Homeodomain Transcription Factors, Six6 and Six3, in the Circadian Regulation of Reproduction
Not-Specified	7R21HD088792-02	the Impact of Piwi Associated Transcripts in Xenopus Germ Cell Development
Female-based	1R15HD087911-01	The Interaction Between Nat2 Acetylator Status and Exposure to Tobacco Smoke on Ovarian Reserve and in Vitro Fertilization Outcomes.
Female-based	1R01HD091117-01A1	The Oocyte's Progression Through Meiosis: Involvement of a Heart Disease-associated Protein
Female-based	1R01HD096077-01A1	The Role of FOS in the Ovary
Male-based	1R03HD090306-01	the Role of Transcription Factor S-sox5 in Male Fertility and Sperm Flagella Formation
Female-based	1R21HD094293-01A1	Timing Endometrial Receptivity
Female-based	1R01HD098278-01	Towards a Preclinical Model for Overcoming Infertility With Induced Pluripotent Stem Cells
Female-based	3R01ES027051-02S1	Transdisciplinary Approach to Rapidly Identify Reproductive Toxics in Pregnant Women and Newborns
Male-based	1R03OH011540-01	Transgenerational Work Exposures, EDCs and Male Fertility
Male-based	1R44HD100256-01	Translational Feasibility of an Oral, Non-hormonal, Male Contraceptive Pill
Male-based	1R56AG052581-01A1	Tumor Suppressors Mediate a Reduction in Male Gamete Quality With Aging
Female-based	1R21ES028963-01A1	Water Disinfection by-products and Female Fertility
Male-based	1R01GM130691-01	Y Chromosome Evolution

Supplementary Table VII - Research project titles from the NIH (US) funding agencies. Some projects titles are repeated; however they would have separate grants awarded under different project IDs. Further information on each research project can be found in NIH Dataset_EG_CDJ_CLRB.

Supplementary Table VIII: The NIHR's Sum of Funding Awarded for the HRCS Health Categories

HRCS Health Categories	Total Funding Awarded (£)
Mental Health	493,552,549
Generic Health Relevance	484,950,225
Cancer and Neoplasms	347,947,217
Infection	275,265,348
Cardiovascular	224,898,509
Neurological	222,002,645
Reproductive Health and Childbirth	216,618,019
Oral and Gastrointestinal	164,146,703
Respiratory	146,665,215
Metabolic and Endocrine	129,821,105
Musculoskeletal	126,596,631
Stroke	121,450,341
Injuries and Accidents	119,415,772
Renal and Urogenital	108,827,444
Skin	66,127,071
Eye	63,433,235
Inflammatory and Immune System	54,122,033
Blood	29,836,676
Disputed etiology and other	23,847,721
Congenital Disorders	18,740,901
Ear	11,238,128

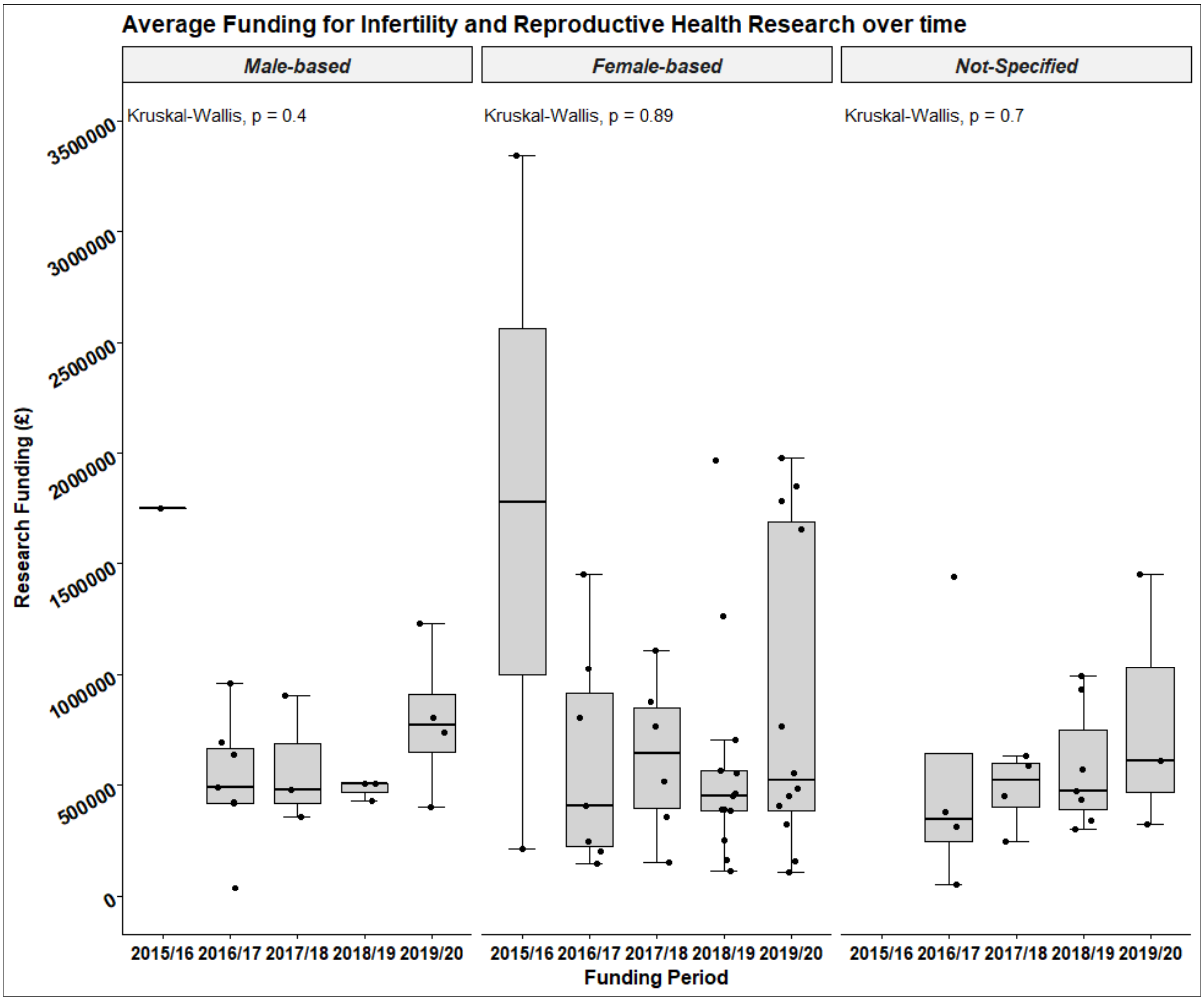
Supplementary Table VIII - The NIHR's Total Funding Awarded for the 21 health categories of research and specialties as of April 1st, 2011. The present data is extracted from the NIHR's Open Data.

Supplementary Table IX : Estimated Proportion of Funding to RCDC by the NIH against the NIH's Total Budget

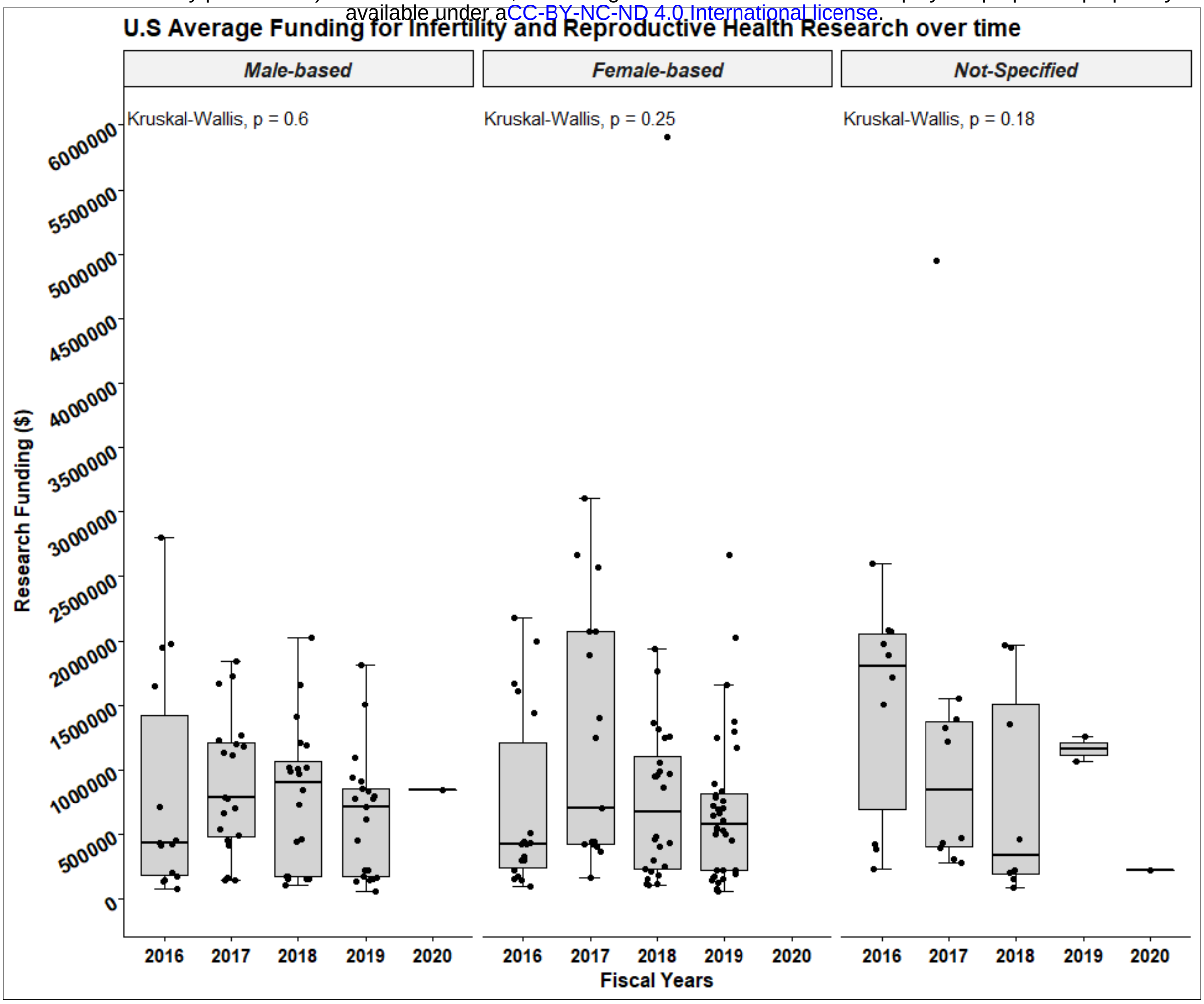
RCDC		Fiscal Years			
		2016	2017	2018	2019
Contraception/ Reproduction	Value ($000)	419,000	437,000	496,000	547,000
	(%)	1.85	1.82	1.91	1.94
Infertility	Value ($000)	86,000	94,000	120,000	151,000
	(%)	0.38	0.39	0.46	0.54
Obesity	Value ($000)	965,000	999,000	1,055,000	1,109,000
	(%)	4.26	4.16	4.07	3.94
Mental Health	Value ($000)	2,454,000	2,717,000	3,010,000	3,296,000
	(%)	10.83	11.31	11.62	11.71
Total NIH Research Funding ($)		22,649,752,290	24,031,670,764	25,906,788,735	28,143,252,479

Supplementary Table IX: The NIH fund 299 various research, conditions, and diseases categories (RCDC) and a project can fall under multiple RCDCs as the NIH does not budget research per category NIH, 2021). The estimated proportion of funding for the chosen categories of contraception/ reproduction, infertility, obesity, and mental health against the annual NIH total research grant funding between FY2016 to FY2019. The FY2020 was excluded from this table as only 2 projects were collected and would be incomparable. Value ($000) refers to the estimated funding by the NIH RCDC Categorical Spending in millions. (%) is the calculated funding percentage or proportion for the RCDCs from the annual NIH Total Research Funding

Supplementary Figures:



Supplementary Figure 1: The UK average funding across consecutive funding periods box-and-whisker plot with a 95% CI. 3 projects were collected between January 1st to March 31st, 2016, for the 2015/16 funding period, therefore many projects were not expected to be awarded funding. No statistically significant differences of funding variation were observed by the Kruskal-Wallis test over the consecutive funding periods of each research group. In the male-based group, P=0.39 and χ^2=4.08 with 4 degrees of freedom. For the female-based group, P=0.89 and χ^2=1.1 with 4 degrees of freedom. In the not-specified group, P=0.7 and χ^2=1.41 with 3 degrees of freedom.



Supplementary Figure *2*: Box-and-whisker plot has a 95% CI for the funding awarded across the five consecutive FYs by the NIH institutes. In the FY2020, 2 projects were awarded funding between 1st October to 31st December 2019. The Kruskal-Wallis did not observe statistically significant differences of funding variation over the consecutive FYs of each research group. For the male-based group, P=0.59 and χ^2=2.76 with 4 degrees of freedom. In the female-based group, P=0.25 and χ^2=4.12 with 3 degrees of freedom. In the not-specified group, P=0.18 and χ^2=6.28 with 4 degrees of freedom.