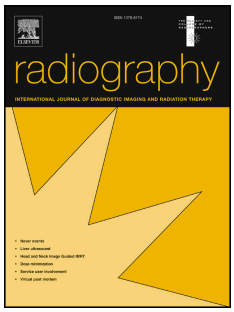
CORA Cork Open Research Archive
Cartlann Taighde Oscailte Chorcaí

Title	The gendered impact of the COVID-19 pandemic on academics working in Medical Imaging and Radiation Therapy
Authors	O'Donoghue, K.;Malamateniou, C.;Walton, L.;England, A.;Moore, N.;McEntee, Mark F.
Publication date	2022-07-18
Original Citation	O'Donoghue, K., Malamateniou, C., Walton, L., England, A., Moore, N. and McEntee, M. F. (2022) 'The gendered impact of the COVID-19 pandemic on academics working in medical imaging and radiation therapy', Radiography, 28, pp.S41-S49. https://dooi.org/10.1016/j.radi.2022.07.001
Type of publication	Article (peer-reviewed)
Link to publisher's version	10.1016/j.radi.2022.07.001
Rights	© 2022. Published by Elsevier Ltd on behalf of the College of Radiographers. - https://creativecommons.org/licenses/by-nc-nd/4.0/
Download date	2026-11-07 15:20:16
Item downloaded from	https://hdl.handle.net/10468/13441

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Journal Pre-proof



The Gendered impact of the COVID-19 pandemic on academics working in Medical Imaging and Radiation Therapy

K. O'Donoghue, MSc., C. Malamateniou, BSc (Hons), MA (Cl. Ed), PhD., L. Walton, BSc (Hons), MSc, PhD., A. England, BSc (Hons), MSc, PhD., N. Moore, BSc (Hons), MSc., M.F. McEntee, BSc (Hons, PhD

PII: S1078-8174(22)00095-5

DOI: https://doi.org/10.1016/j.radi.2022.07.001

Reference: YRADI 2285

To appear in: *Radiography*

Received Date: 19 April 2022

Revised Date: 4 June 2022

Accepted Date: 2 July 2022

Please cite this article as: O'Donoghue K, Malamateniou C, Walton L, England A, Moore N, McEntee MF, The Gendered impact of the COVID-19 pandemic on academics working in Medical Imaging and Radiation Therapy, *Radiography*, https://doi.org/10.1016/j.radi.2022.07.001.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2022 Published by Elsevier Ltd on behalf of The College of Radiographers.

Journal Pre-proof

The Gendered impact of the COVID-19 pandemic on academics working in Medical Imaging and Radiation Therapy

O'Donoghue, K. MSc.
Malamateniou, C. BSc (Hons), MA (Cl. Ed), PhD.
Walton, L. BSc (Hons), MSc, PhD.
England, A. BSc (Hons), MSc, PhD.
Moore, N. BSc (Hons), MSc.
McEntee, M.F. BSc (Hons, PhD.

Corresponding author: Prof. Mark F. McEntee, Chair of Diagnostic Radiography, UGF 12 ASSERT, Brookfield Health Sciences. University College Cork, College Road, Cork, T12 AK54, Ireland (mark.mcentee@ucc.ie) +353214205651.

Journal Pre-proof

Journal Pre-proof

Abstract

Introduction: Healthcare workers have been particularly impacted by the COVID-19 pandemic, as have those educating them, albeit differently. Several papers have identified a gendered difference in the impact of the pandemic. This study aims to determine impact of COVID-19 on the health and wellbeing of Medical Imaging and Radiation Therapy (MIRT) academics.

Methods: An electronic survey was designed in English on Qualtrics and distributed via email and online platforms to MIRT academics. Fifty-one questions were used; demographic (n=9), work patterns (n=11), general health (n=8), mental health (n=2), physical health (n=10), and workload (n=11). Overall, 46 were quantitative and five were qualitative 'open-ended' questions. The survey was open between 3rd March 2021 to 1st May 2021. Quantitative analysis was carried out using MS Excel v 16.61.1ss and SPSS v26.

Results: The survey reached 32 countries globally and 412 participants; 23.5% identified as men (n=97) and 76.5% as women (n=315). Women reported worse sleep quality than men and overwhelmingly felt they would not like to work remotely again if given a choice. A higher percentage of males,73% versus 40.5% of females reported getting outdoors less. The CORE-10 validated questionnaire found that 10.3% of males (n= 42) and 2.7% of females (n=11) experienced severe psychological distress the week immediately before the survey was conducted.

Conclusion: While the study has identified some gender-related differences in the impact of COVID-19 on the mental and physical health of MIRT academics, both males and females have experienced significant deterioration in health and wellbeing due to the pandemic.

Implication for Practice: Developing mental health support for MIRT academics and defining optimum methods for raising awareness is recommended.

Keywords

COVID-19, academics, researchers, well-being, health, gender

Introduction

Medical Imaging and Radiation Therapy academics have been adapting teaching and research practice to the global pandemic since March 2020, when a worldwide pandemic was declared by the World-Health-Organisation (1, 2). After the first cases of COVID-19 were reported in Wuhan, China, in December 2019 (3), the rapid spread of the virus and the lack of knowledge about its symptoms and transmission led to the implementation of Public Health measures, including face mask-wearing, social distancing, travel restrictions, working from home and national lockdowns. Restrictions on public activity were applied at different time points worldwide to coincide with the virus peak in each country. Teaching in-person was stopped, learning moved on-line, research labs were inaccessible, international students were stranded, arranged collaborations and conferences cancelled.

Society has experienced "*an unprecedented crisis in our interconnected world where health and wellbeing, security, and economy affect populations across borders*" (4) Globally, as of 3 June 2022, there have been 528,816,317 confirmed cases of COVID-19, including 6,294,969 deaths, reported to WHO. (5, 6). Adapting to new ways of living and compliance with ever-changing guidelines and restrictions has become a new way of life for many.

The lives of many frontline healthcare workers, including radiographers, have been impacted by the COVID-19 pandemic (7, 8). Healthcare professionals have faced particular challenges concerning their well-being and workflow- or workload-related (9). Radiographers, radiation therapists, sonographers, nuclear medicine technologists have worked extra hours, often without taking any leave, wearing heavy, multi-layer Personal Protective Equipment (PPE) while caring for the unwell patients. Many radiographers contracted the virus, became unwell, and some have died. Some healthcare workers have lived with "long COVID" for prolonged timeframes following their inceptive infection (10). The rest worked with the fear of becoming unwell themselves; despite all these challenges, radiographers have faced the pandemic with remarkable bravery and altruism.

Journal Pre-proof

Although radiography academics and researchers were instructed to work from home during the pandemic, they have faced different challenges. Employment uncertainty has impacted many radiographers in academia. A sharp fall in the number of international students placed economic pressure and restructured many Universities worldwide. Working and having a stable job is vital for maintaining one's mental and physical health (11). "*Insecure employment has affected those in precarious housing situations, with rent and mortgages increasingly difficult to maintain*" (12, 13). Junior Medical Imaging and Radiation Therapy (MIRT) academics and early-career researchers were impacted by funding modifications, ceasing of projects and funding and inability to publish due to lack of research data (14).

Academics, clinical academics, researchers and educators have faced further challenges during the pandemic within their personal and working lives. MIRT academics were expected to adjust placement patterns quickly, online curricula, reformulate research projects, design new ways of remote teaching and learning, redesign teaching spaces and resources, and offer emotional support and personal tutoring for many more students working on the frontline. Working antisocial hours, teaching online, and offering round the clock support to students became the "new normal", leaving little personal time. A significant number of factors dividing gender roles while working from home during the pandemic have been identified in the literature, including parenting, caring responsibilities, household chores, pay gaps and expectations and leadership differences (15, 16). Most recent research suggests that the pandemic has contributed to the burnout of academics and researchers, reducing their mental and physical health (17-19).

Having a job is vital for good mental and physical health (11). People have faced uncertainty in terms of employment due to the implications of COVID-19. "*Insecure employment has affected those in precarious housing situations, with rent and mortgages increasingly difficult to maintain*" (12, 13). This is especially true for MIRT junior academics and early-career researchers. Research was significantly impacted with discontinuation, or significant adjustments of projects and grants, and those employed in these fields have struggled with reduced working hour contracts, inability

to publish due to lack of results, stalling careers, lack of motivation, to name just a few (14).

Academics, researchers, and educators have fought their own battle regarding their personal and working lives and teaching and research responsibilities. Concerns have arisen relating to the possibility of unconfirmed future funding for research, thereby leaving many researchers unsure of where they stand going forward with their careers (14). MIRT academics and researchers were expected to adjust placement patterns quickly, online curricula, reformulate research projects, design new ways of remote-learning, redesign lab spaces and resources, and offer emotional support and personal tutoring for many more students. They were often required to work antisocial hours at the expense of their families, offering maximum flexibility to students while chasing their deadlines for the new approaching academic year. While little research has been carried out to date, recent research suggests that the pandemic contributes to the burnout of academics and researchers concerning their mental and physical health (17-19). "*It is crucial to recognise students and teachers' remarkable adaptation to this new form of class, where physical presence was replaced by technology, altering the student/teacher relationship considerably*" (20).

Many factors dividing gender roles while working from home during the pandemic have been identified in the literature, including parenting, caring responsibilities, household chores, pay gaps and expectations and leadership differences (15, 16). Most recent research suggests that the pandemic has contributed to the burnout of academics and researchers, impacting their mental and physical health and capacity to work for the longer term (17-19).

A small cohort of female academics was studied in Michigan. Results showed that "*these women were able to balance career and family demands but only at the expense of becoming accustomed to little sleep*" (21). Amid the pandemic, more than 1.5 billion children were out of school. Due to the closure of childcare facilities, many families had no choice but to home-school and make adjustments to facilitate remote-working for at least one, if not both, of the parents. A recent study on the effect of the pandemic on remote-working suggests that in terms of their most popular occupations

by gender, men were more likely to adapt to the new work environment during the pandemic (22).

As conclusive evidence has not yet been compiled on the impact of the pandemic, much more research is required. Therefore, this study aims to investigate the effect of the COVID-19 pandemic on the mental and physical health of MIRT academics.

Methods

A prospective qualitative and quantitative questionnaire-based study was approved by University College Cork Social Research Ethics Committee (CT-SREC-2020-35) and was conducted among medical imaging and radiation therapy (MIRT) academics globally. The online survey was disseminated online via email to personal contacts of the researchers' professional networks (Twitter accounts, Facebook pages, LinkedIn posts) and through the European Federation of Radiographer Societies (EFRS) Research Hub held at the European Congress of Radiology 2022. Snowballing occurred whereby shared posts on social media were liked and re-shared. The survey was advertised and disseminated among attendees at the online European Congress of Radiology, which took place online between the 3rd and 7th March 2021 and online via social media. Attendees also include those working outside of Europe and, together with advertising, respondents could access the survey from outside of Europe. The online survey deployment coincided with periods of extended national lockdowns for many countries in the northern hemisphere (23, 24) which ensured the currency and relevance of the responses.

The study was aimed at all MIRT academics globally, working in research, teaching or another academic capacity in this field during the pandemic. MIRT academics include radiation therapists, a.k.a therapeutic radiographers, diagnostic radiographers also known as radiological or radiation technologists, nuclear medicine technologists, and (ultra)sonographers. The age of study participants was restricted to those over 18 years old. Emeritus or retired academics or those with honorary academic contracts were asked not to participate due to the perception that the work patterns of honorary, emeritus or retired academics may vary from that of the population of interest.

A variety of questions were selected; these were specific to mental and physical health and were relevant to the target population of MIRT academics. Responses were requested based on participants' own experiences of their health during the COVID-19 pandemic. Fifty-one questions were used in the survey; six were demographic, 11 were based on work patterns, eight were on general health, two were on mental health (with ten sub-questions), ten were on physical health, and 11 were on were on workload. Overall, 46 were quantitative 'tick-box style', and five were qualitative 'open-ended' questions used for deeper analysis with no word limits imposed.

The first part of the questionnaire captured demographic statistics to determine the population of interest, including age, gender, residence and remote-working. The second section addressed participants' mental health using the CORE-10 (25). The CORE-10 is a ten statement Likert scale survey and was used to identify perceptions of mental health in males and females since they started working remotely and within the week before completing the survey. The validated psychometric screening tool is used widely for mental health screening purposes (26-28). Ten statements indicate responses scoring an overall level of psychological distress. Participants were scored on a scale of 0-40, negative factors scoring 0-1 and positive factors scoring 4-0 (**Fig. 1**). There was an overall score for the CORE-10, a maximum of 40 and a minimum of 0.

Figure 1. CORE-10 Scoring System. Participants were scored on a scale of 0-40, with negative factors scoring 0-1 and positive factors scoring 4-0 (25)

Over the last week…		Not all all	Only occasionally	Sometimes	Often	Most or all of the time
1	I have felt tense, anxious or nervous	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
2	I have felt I have someone to turn to for support when needed	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
3	I have felt able to cope when things go wrong	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
4	Talking to people has felt too much for me	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
5	I have felt panic or terror	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
6	I made plans to end my life	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
7	I have had difficulty getting to sleep or staying asleep	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
8	I have felt despairing of hopeless	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

9	I have felt unhappy	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
10	Unwanted images or memories have been distressing me	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

The CORE-10 model, a psychometric Likert scale, allowed respondents to rate on a 5-point scale how well they had been sleeping for the week before commencing the survey. The CORE10 measurement tool measured psychological distress for the week before completing the survey and before participants started working remotely. Participants were asked to choose from a selection of five different health states, ranging from healthy to severe psychological distress.

Within the study, a CORE-10 overall score was calculated. This was calculated by adding all ten numbers to score between 0 and 40 (total score). A CORE-10 score estimates the level of psychological distress and indicates mental health. Broad interpretations of the total score are 0-5 healthy; >5 to 10 low-level problems; >10 to 15 mild psychological distress; >15 to 20 moderate distress; >20 to 25 moderately severe distress and >25 to 40 severe psychological distress.

Statistical Analysis

The survey was designed and deployed using the Qualtrics XM software platform (Qualtrics, London, UK). The inferential and descriptive statistical analysis used the statistical software SPSS Version 26 (IBM Inc, Armonk, NY) and Excel 2016 (Microsoft Corp, Redmond, WA). Statistical analysis of the data was carried out using the Chi-squared test, Wilcoxon test and Mann-Whitney U test. Microsoft Excel was used to calculate individual scores from the CORE-10 survey. Statistical significance was assumed where p values were less than 0.05.

Results

The survey reached 32 countries and 412 participants; 23.5% were male (n=97) and 76.5% were female (n=315). Of those who started the survey, only 7% of participants failed to complete all responses; therefore, the survey achieved an overall completion rate of 93% (n=383). Participants' demographics are shown in **Table 1;** these are broken down by gender, age and country of residence. **Table 2** shows the responses of 215 participants indicating their living environment, their working status, and their

work from home situation. Not all respondents to the questionnaire answered this question. Of particular note, when respondents were asked, 'At any stage in the years 2020 or 2021, have you been asked to work from home?' Male and female results were opposite, with 62% of males indicating that they had been asked to work from home while only 31% of female respondents indicated they had been asked to work from home (**Figure 2**).

Journal Pre-proof

Table 1. Demographic Information

		Count (%)		
Gender	Female	315 (76.5%)		
	Male	97 (23.5%)		
	Total	*412 (100%)*		
		Total	**Male**	**Female**
Age (years)	20-29	59 (14.3%)	11 (2.7%)	48 (11.7%)
	30-39	112 (27.2%)	30 (7.3%)	82 (19.9%)
	40-49	107 (26.0%)	26 (6.3%)	81 (19.7%)
	50-59	104 (25.2%)	21 (5.1%)	83 (20.1%)
	60-69	28 (6.8%)	8 (1.9%)	20 (4.9%)
	70+	2 (0.5%)	1 (0.2%)	1 (0.2%)
	Total	*412 (100%)*	*97 (23.5%)*	*315 (76.5%)*

Country of residence	Canada	246 (59.7%)	29 (7.0%)	217 (52.7%)
	United Kingdom and Northern Ireland	65 (15.8%)	27 (6.6%)	38 (9.2%)
	United States of America	22 (5.3%)	6 (1.5%)	16 (3.9%)
	Republic of Ireland	19 (4.6%)	3 (0.7%)	16 (3.9%)
	Rest of the world*	50 (14.6%)	32 (7.8%)	28 (6.8%)
	Total	*412 (100%)*	*97 (23.5%)*	*315 (76.5%)*
Percentage values are representative of the proportion of the sample responding to the specific question. * There were 27 countries represented by “other”, 17 of which were European, the 10 were from Australasia and Africa				

Journal Pre-proof

Table 2. Describes the type of residence that participants were living in, the type of work they were carrying out, and their working from home circumstances.		
	Count (%)	
In what type of residence do you live?	**Male**	**Female**
Own house	60 (19.7%)	245 (80.3%)
Own apartment	15 (38.5%)	24 (61.5%)
Shared accommodation (renting)	14 (33.3%)	28 (66.7%)
Living with family	17 (24.6%)	52 (75.4%)
Living with friend(s)	3 (75.0%)	1 (25.0%)
Living alone	5 (29.4%)	12 (70.6%)
Other	0 (0%)	1 (100%)
Which of the following best describes your work?		
Full time	80 (25.6%)	233 (74.4%)
Part time (%)	16 (16.3%)	82 (83.7%)
Research only	1 (50.0%)	1 (50.0%)
Teaching only	7 (36.8%)	12 (63.2%)
Diagnostic Radiography Academic	35 (40.7%)	51 (59.3%)
Therapeutic Radiography Academic	7 (31.8%)	15 (68.2%)
Nuclear Medicine Academic	6 (42.9%)	8 (57.1%)
Research and Teaching	23 (46.0%)	27 (54.0%)
Which best describes your working from home situation?		
Young child(ren) in the home	23 (40.4%)	34 (59.6%)
Caring for elderly parent/relative	3 (25.0%)	9 (75.0%)
Partner also working remotely	28 (35.9%)	50 (64.1%)
Housemates also working remotely	5 (50.0%)	5 (50.0%)
Working remotely alone	23 (39.7%)	35 (60.3%)
The table is broken down by gender, and statistically significant differences are demonstrated with an Asterix (*)		

Journal Pre-proof

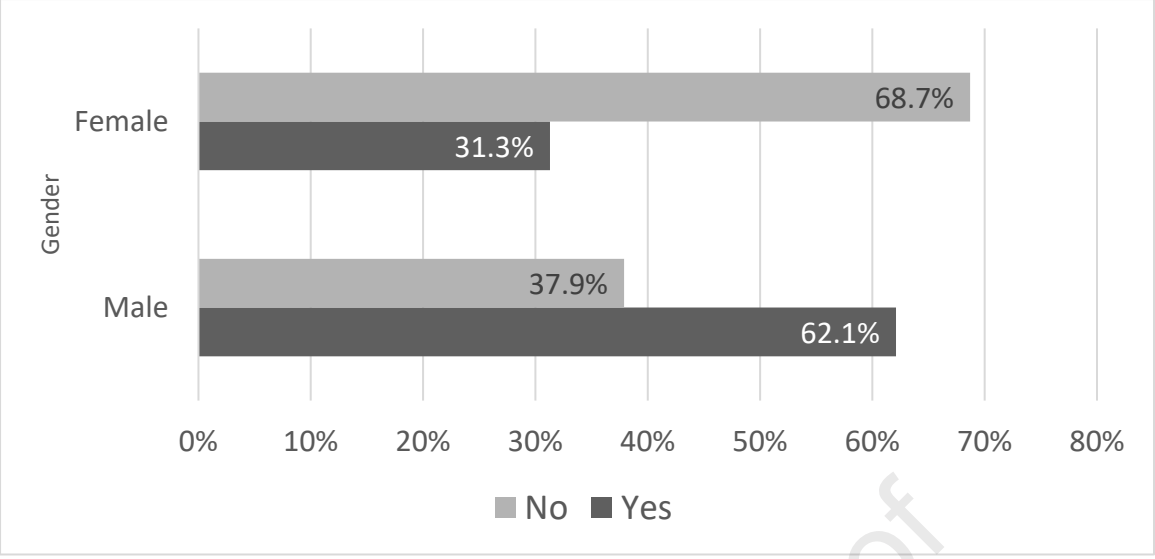


Figure 2. Bar chart illustrating the results of 'at any stage in the years 2020 or 2021, have you been asked to work from home?'

The results from the CORE-10 survey are summarised in **Figure 3,** and an overview is available in **Table 3**. Overall, males and females showed very similar responses to the CORE-10 questions. Significant differences in the ratings of answers are shown in **Table 3**.

Journal Pre-proof

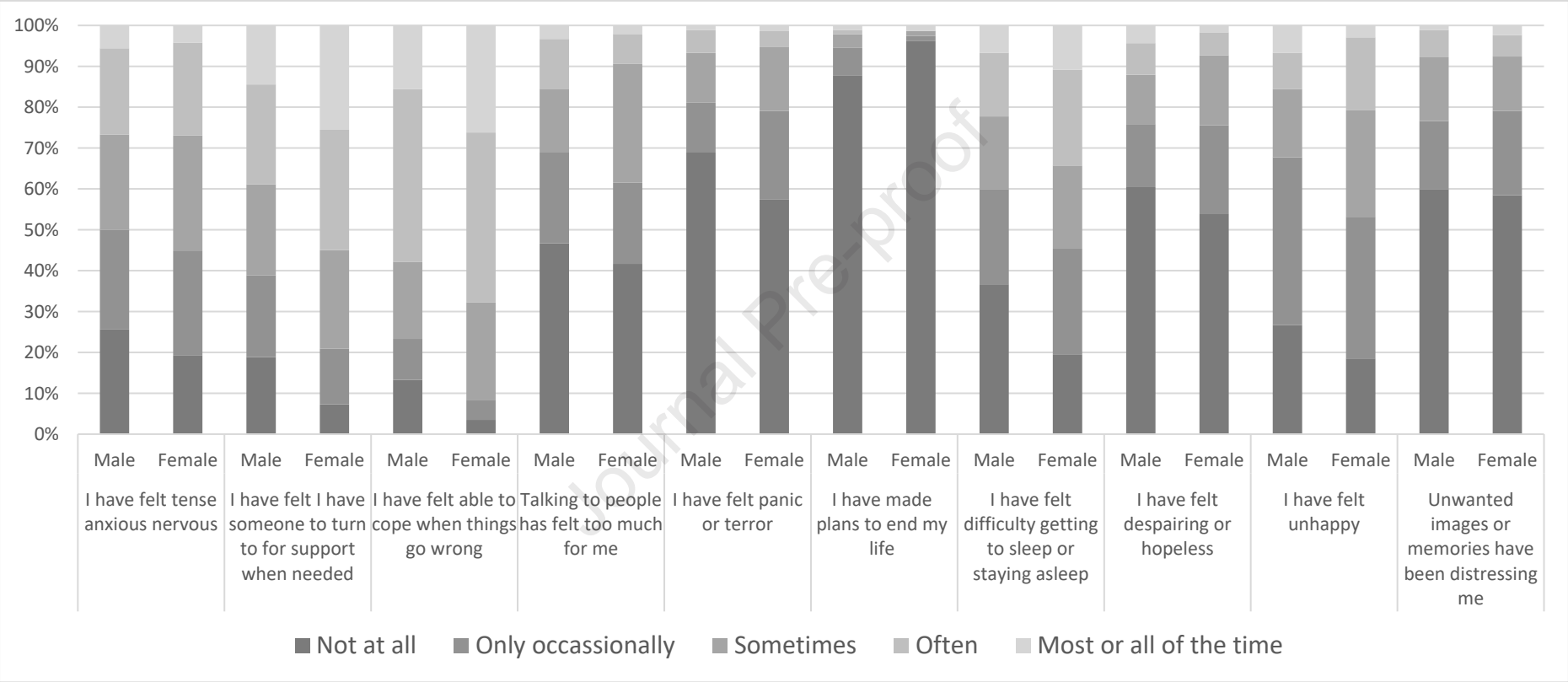


Figure 3. Chart illustrating the CORE-10 results for participants' perception of their mental health in the week immediately prior to commencing the survey.

Journal Pre-proof

Table 3 - Participants' answers for the CORE-10 Model for Mental Health Scoring in the week immediately prior to commencing the survey. Answers denoted with an Asterix (*) highlight statistically significant variables between genders (m=90, f=286). The highest percentage and modal answers are in bold.

CORE-10 Question		Not at all (1)	Occasionally (2)	Sometimes (3)	Often (4)	Most / all of the time (5)	Median	Mode	SD	Mean
I have felt tense, anxious or nervous	M	**23 (25.6%)**	22 (24.4%)	21 (23.3%)	19 (21.1%)	5 (5.6%)	2.5	1.0	1.2	2.6
	F	55 (19.2%)	73 (25.5%)	**81 (28.3%)**	65 (22.7%)	12 (4.2%)	3.0	3.0	1.2	2.7
I have felt I have someone to turn to for support when needed	M	17 (18.8%)*	18 (20%)*	20 (22.2%)	**22 (24.4%)**	13 (14.4%)	3.0	4.0	1.3	3.0
	F	21 (7.3%)	39 (13.6%)	69 (24.1%)	**84 (29.4%)**	73 (25.5%)*	4.0	4.0	1.2	3.5*
I have felt able to cope when things go wrong	M	12 (13.3%)*	9 (10%)*	17 (18.9%)	**38 (42.2%)**	14 (15.6%)	4.0	4.0	1.3	3.4
	F	10 (3.5%)	14 (4.9%)	68 (23.8%)	**119 (41.6%)**	75 (26.2%)*	4.0	4.0	1.0	3.8
Talking to people has felt too much for me	M	**42 (46.7%)**	20 (22.2%)	14 (15.6%)	11 (12.2%)	3 (3.3%)	2.0	1.0	1.2	2.0
	F	**119 (41.6%)**	57 (19.9%)	83 (29%)	21 (7.3%)	6 (2.1%)	2.0	1.0	1.1	2.1
I have felt panic or terror	M	**62 (68.9%)**	11 (12.2%)	11 (12.2%)	5 (5.6%)	1 (1.1%)	1.0	1.0	1.0	1.6
	F	**164 (57.3%)**	62 (21.7%)	45 (15.7%)	11 (3.8%)	4 (1.4%)	1.0	1.0	1.0	1.7
I have made plans to end my life	M	**79 (87.8%)**	6 (6.7%)*	3 (3.3%)	1 (1.1%)	1 (1.1%)	1.0	1.0	0.7	1.2
	F	**227 (79.4%)**	3 (1%)	3 (1%)	0 (0.0%)	3 (1%)	1.0	1.0	0.5	1.1
I have felt difficulty getting to sleep or staying asleep	M	**33 (36.7%)***	21 (23.3%)	16 (17.8%)	14 (15.6%)	6 (6.7%)	2.0	1.0	1.3	2.3
	F	59 (20.6%)	**79 (27.6%)**	59 (21.6%)	56 (24.9%)*	33 (11.5%)	3.0	2.0	1.3	2.7*
I have felt despairing or hopeless	M	**55 (61.1%)**	14 (15.6%)	11 (12.2%)	7 (7.8%)	4 (4.4%)	1.0	1.0	1.2	1.8
	F	**154 (53.8%)**	62 (21.7%)	49 (17.1%)	16 (5.6%)	5 (1.7%)	1.0	1.0	1.0	1.8
I have felt unhappy	M	24 (26.7%)	**37 (41.1%)**	15 (16.7%)	8 (8.9%)	6 (6.7%)	2.0	2.0	1.2	2.3
	F	56 (19.6%)	**105 (36.7%)**	79 (27.6%)	37 (18.9%)*	9 (3.1%)	2.0	2.0	1.0	2.4
Unwanted images or memories have been distressing me	M	**54 (60%)**	15 (16.7%)	14 (15.6%)	6 (6.7%)	1 (1.1%)	1.0	1.0	1.1	1.7

Journal Pre-proof

	F	**167 (58.4%)**	59 (20.6%)	38 (13.3%)	15 (5.2%)	7 (2.4%)	1.0	1.0	1.0	1.7
The table is broken down by gender, and statistically significant differences are demonstrated with an Asterix (*)										

Journal Pre-proof

Very similar frequencies were found in healthy, low and mild psychological distress states. However, there was a significant difference in the higher CORE-10 scores, with 10.3% males and 2.7% females reporting that they experienced severe psychological distress in the week before completing the survey (**Figure 4**).

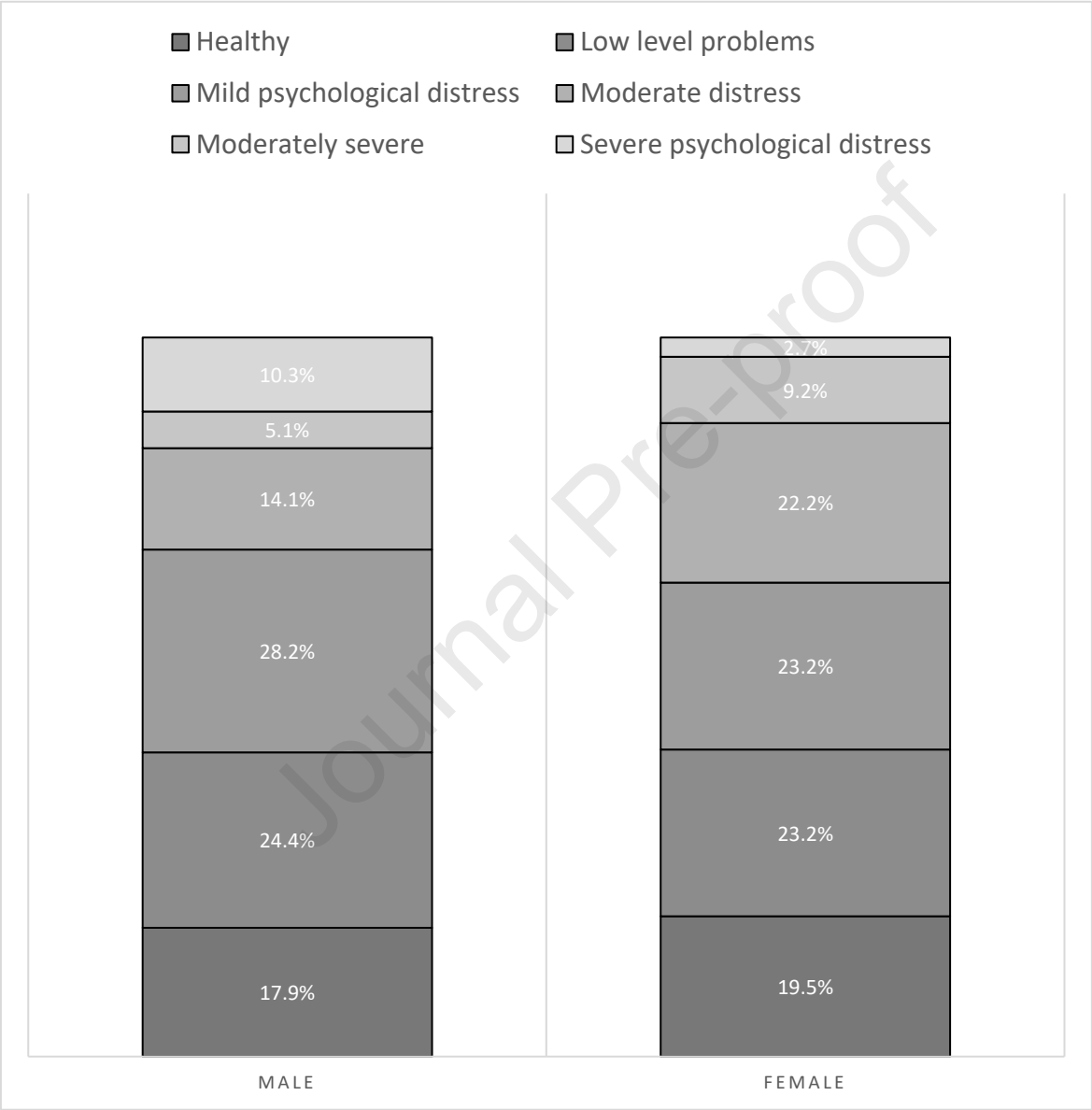


Figure 4 – Valued estimates of mental health scoring as of validated CORE-10 Model of Mental Health when participants were asked to report 'over the past week'.

With regard to the questions on physical health that participants answered (**Table 4**). Working hours increased in males (61.9%) compared with females (48.5%). Males (12.4%) also had better quality sleep than females (1.8%). However, a much higher percentage of males (73%) reported getting outdoors less during the pandemic than females (40.5%).

Journal Pre-proof

Table 4 – Physical health questionnaire demonstrating the % increase and decrease in behaviours. Highly significant differences between males and females (p<0.001) are denoted with an asterix.

Since the pandemic;	**Gender**	**Degree of change, Count (%)**		
		Increased	**Decreased**	**Not changed**
My energy levels have	Male	4 (4.5%)	22 (24.7%)	63 (70.8%)
	Female	13 (4.6%)	69 (24.3%)	202 (71.1%)
My activity levels have	Male	11 (12.4%)	17 (19.1%)	61 (68.5%)
	Female	47 (16.5%)	70 (24.6%)	167 (58.8%)
My snacking has	Male	37 (41.6%)	12 (13.5%)	40 (44.9%)
	Female	152 (53.5%)	21 (7.4%)	111 (39.1%)
My weight has	Male	38 (42.7%)	15 (16.9%)	36 (40.4%)
	Female	152 (53.5%)	33 (11.6%)	99 (34.9%)
My water intake has	Male	19 (21.3%)	21 (23.6%)	49 (55.1%)
	Female	38 (16.5%)	89 (31.3%)	157 (55.3%)
My caffeine intake has	Male	30 (33.7%)	10 (11.2%)	49 (55.1%)
	Female	106 (37.3%)	17 (6.0%)	161 (56.7%)
My alcohol intake has	Male	25 (28.4%)	20 (22.7%)	43 (48.9%)
	Female	85 (30.0%)	43 (15.2%)	155 (54.8%)
My workload has	Male	58 (70.2%)	11 (13.1%)	14(16.7%)
	Female	184 (70.2%)	30 (11.5%)	48 (18.3%)
My working hours	Male	52(61.9%)*	8 (9.5%)	24 (28.6%)
	Female	127 (48.5%)	18 (6.9%)	117 (44.7%)*
		Improved	**Worsened**	**Not changed**
My diet quality has	Male	19 (21.3%)	34 (38.2%)	36 (40.4%)
	Female	38 (13.4%)	140 (49.3%)	106 (37.3%)
My sleep quality has	Male	11 (12.4%)*	38 (42.7%)	40 (44.9%)
	Female	5 (1.8%)	126 (44.4%)	153 (53.9%)
My sitting practices have	Male	4 (4.5%)	46 (51.7%)	39 (43.8%)
	Female	11 (3.9%)	122 (43.0%)	151 (53.2%)
		More often	**Less often**	**No different**
I have been getting outdoors	Male	11 (12.4%)	65 (73.0%)*	13 (14.6%)
	Female	73 (25.7%)*	115 (40.5%)	96 (33.8%)*

Statistically significant differences are demonstrated with an Asterix (*).

Journal Pre-proof

As seen in **Figure 5**, almost twice as many females (53.8%) as males (27.4%) chose 'very unlikely' to work remotely again. Changes to sleep habits are seen in **Figure 6**, whereby 55.5% of females who chose 'very unlikely' also report sleeping worse.

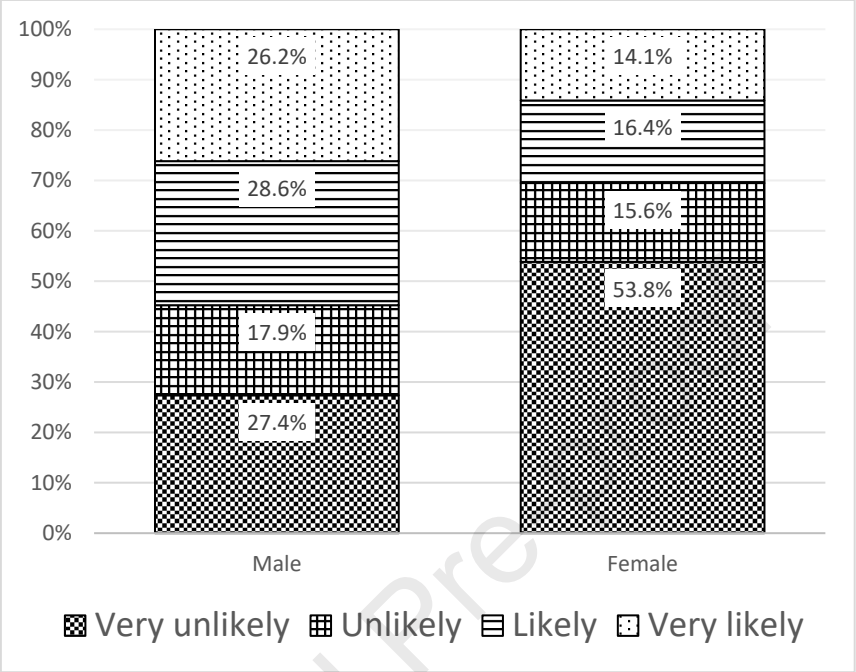


Figure 5. Bar chart displaying the results for the question "How likely would it be that you would choose to work from home in the future, if feasible?"

Results for changes in sleep habits (**Figure 6**), reflecting the CORE-10 question, *'I have had trouble getting to sleep or staying asleep*, which yielded a statistically significant effect (p=0.039). Of those females indicating that they were very unlikely to work from home, 55.4% indicated sleeping worse.

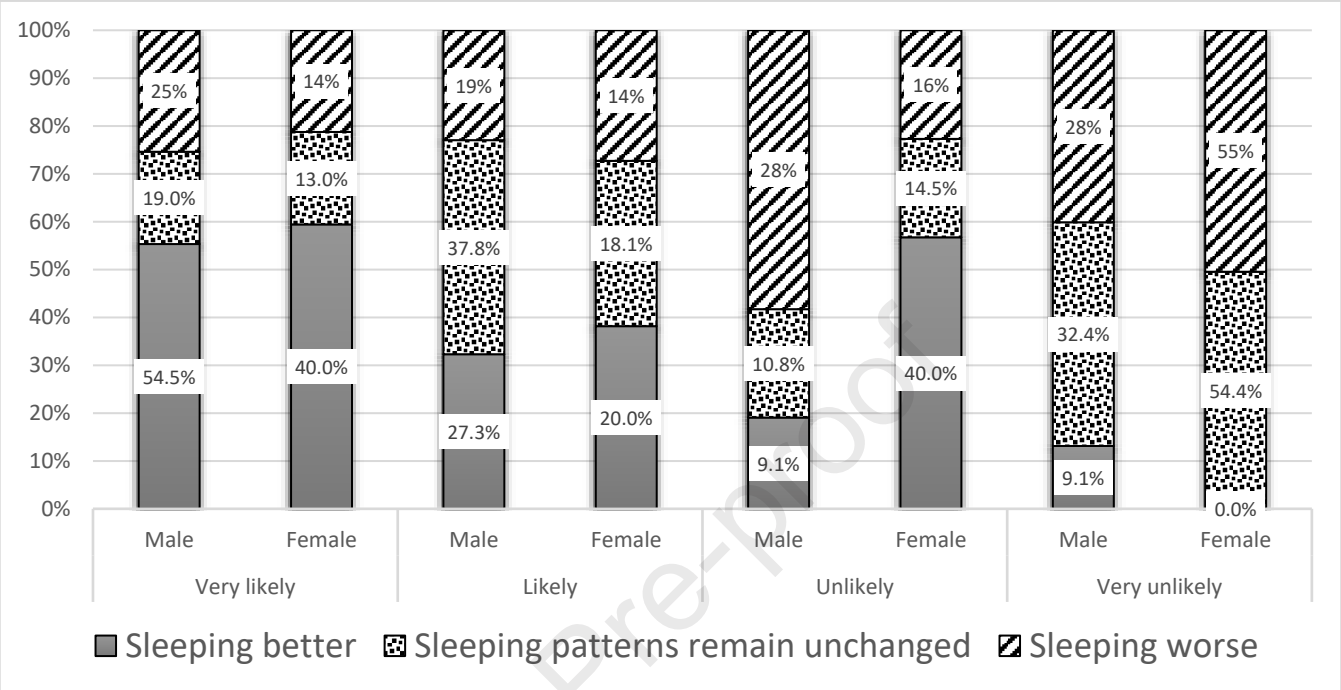


Figure 6 – Participants were asked how likely would it be that they would choose to work from home in the future, if feasible. The graph shows the relationship between their rating of Very likely, likely, unlikely and Very Unlikely to work from home against their sleep pattern.

With the use of open-ended questions, participants were given the opportunity to comment on the advantages and disadvantages of working-remotely during the Covid-19 pandemic. Figure 7 and 8 represent the most common answers demonstrated by the participants. The larger fonts represent the most frequent answers and the smaller fonts represent the less recurrent answers.

Journal Pre-proof



Figure 7– Participants' responses about advantages of working remotely



Figure 8 – Participants' responses about the disadvantages of working remotely

Discussion

The mental and physical health of MIRT academics has been affected by the COVID-19 pandemic. This study has identified gendered differences in the health and wellbeing of MIRT academics. Although we cannot yet confirm causation, there is plenty of scope for further research to examine discrepancies identified in the survey. Although many researchers and academics previously worked as healthcare workers and are therefore considered "*highly resilient people*" (29), new ways of living and remote-working have been difficult to adapt to.

Interestingly 62% of males indicated that they had been asked to work from home, while only 31% of female respondents indicated they had been asked to work from home (Figure 2). As all respondents are doing academic work, this finding raises the potential for either differential treatment of genders by employers or a pre-existing different in work patterns preceding the pandemic. PPrevious research has demonstrated a difference in the proportions of men and women working from home varies per country but is roughly 12% for both across the EU30. (30)

Women are generally reported to have better sleep quality than men, with longer sleep times, shorter sleep-onset latency and higher sleep efficiency (30, 31). However, similar to the findings of the current study, recent work found that "*men, but not women, are sleeping more than they did prior to the pandemic*" (32). Sufficient rest and sleep are vital in ensuring good health (33). Sleep has been identified as an important factor impacting the perception of working from home for females in this survey. Further work is needed to investigate the causes of sleep differences in the gender impact of the pandemic on MIRT. Factors such as childcare and carer responsibilities may be important and findings suggest that this was more dominant within females within this study.

The CORE-10 survey identified that females, despite feeling more "tense, anxious or nervous", seem to have overall better mental health than males. Males (10.3%) have roughly four times higher severe psychological distress than females (2.7%). The significant difference in genders may be due to the ability of females to access support networks or knowing when and how to ask for help (34). More females than males have had someone to turn to for support and feeling able to cope when things go wrong. Masculine behaviours could serve as a barrier to seeking help for males and therefore needs to be addressed (35).

A Dutch study found that social loneliness increased among respondents who were "*personally affected by being outdoors less"* (36). A much higher percentage of males are not getting outdoors less often (73.0%) compared to females (40.5%) . The result could be linked to the higher level of psychological distress in males in the CORE-10 study, but again more research needs to be done to explore any causation.

The recession following the pandemic has disproportionately impacted females more than male employees, and this contrasts with how recessions usually affect the workforce, with women being more resilient regarding employment status (37). A more comprehensive, longer-term study is needed to understand the reasons behind this for radiographer academics.

Limitations

The data was collected during the specified time frame, during the pandemic rather than later. Therefore, the experience is fresh in participants' minds, and they find it easier to recall events and feelings at the time of the pandemic. However, this could also be a potential limitation to the study as participants may have still felt pressure with their duties and may have viewed the survey as a chore. Similarly, due to social distancing measures and lockdowns, it was not possible to carry out any other method of data collection such as face-to-face focus groups or interviews, which may have been beneficial for the study outcome.

The average time to complete the online survey was roughly 20 minutes. Participants may not be willing to remain engaged for more than 8-10 minutes and may not expand in great detail on open-ended questions as a result. Participants may have given up early due to too much time typing or giving very brief answers, which may not contribute much to the research. The distribution method for the survey may be another potential issue. If it is poorly designed, it could lead to biased results. Responses were received by participants from 32 countries worldwide. The survey distribution was open to a risk of geographical bias as Canadian MIRT academics alone contributed to over half [246 of 412] of the responses.

Recommendations

Journal Pre-proof

Journal Pre-proof

Given the results of the study, two primary interventions are proposed. Developing mental health support directed at MIRT academics and defining methods for raising awareness of these issues is highly recommended. Institutions are encouraged to reach out to their employees and encourage them to seek mental health support if needed. It is recommended that more extensive research is carried out on the database to ensure all data is scrutinised efficiently. Further research in a qualitative interview or focus group is recommended for more accurate participant experiences.

As this study is the first of its kind to recognise the impact of the COVID-19 pandemic on the health of MIRT academics and researchers, it has the potential to open the doors to further research on this cohort of the population. Our healthcare systems are reliant on research and academia for identifying best practice and supply of newly qualified practitioners.

Conclusion

While both males and females have experienced important health and well-being deterioration due to the pandemic, our study has identified some gendered differences in the impacts of COVID-19 on the mental and physical health of MIRT academics concerning sleep patterns, willingness to return to remote working, psychological distress and remedial mechanisms to compensate for it. Further in-depth research into the health of MIRT academics and researchers is encouraged to enhance this research and identify additional indicators of mental and physical health declined during the COVID-19 pandemic.

Journal Pre-proof

Journal Pre-proof

REFERENCES

1. Ciotti M, Ciccozzi M, Terrinoni A, Jiang W-C, Wang C-B, Bernardini S. The COVID-19 pandemic. Critical reviews in clinical laboratory sciences. 2020;57(6):365-88.
2. Organization WH. Coronavirus disease (COVID-19). 2020.
3. Giovanetti M, Benvenuto D, Angeletti S, Ciccozzi M. The first two cases of 2019‐nCoV in Italy: Where they come from? Journal of medical virology. 2020;92(5):518-21.
4. Gabster BP, van Daalen K, Dhatt R, Barry M. Challenges for the female academic during the COVID-19 pandemic. The Lancet. 2020;395(10242):1968-70.
5.
6. Kwong ASF, Pearson RM, Adams MJ, Northstone K, Tilling K, Smith D, et al. Mental health before and during the COVID-19 pandemic in two longitudinal UK population cohorts. Br J Psychiatry. 2021;218(6):334-43.
7. Lewis S, Mulla F. Diagnostic radiographers' experience of COVID-19, gauteng south africa. Radiography. 2021;27(2):346-51.
8. Foley SJ, O'Loughlin A, Creedon J. Early experiences of radiographers in Ireland during the COVID-19 crisis. Insights into imaging. 2020;11(1):1-8.
9. Miyamoto I. COVID-19 Healthcare Workers: 70% Are Women: Daniel K. Inouye Asia-Pacific Center for Security Studies.; 2020.
10. Mahase E. Covid-19: What do we know about "long covid"? bmj. 2020;370.
11. Burchell B, Wang S, Kamerāde D, Bessa I, Rubery J. Cut hours, not people: no work, furlough, short hours and mental health during COVID-19 pandemic in the UK. 2020.
12. Baker E, Bentley R, Beer A, Daniel L. Renting in the time of COVID-19: understanding the impacts. 2020.
13. Goodman L, Magder D. Avoiding a COVID-19 disaster for renters and the housing market. Washington, DC: Urban Institute. 2020.
14. Rijs C, Fenter F. The academic response to COVID-19. Frontiers in Public Health. 2020;8(797).
15. Daraba D, Wirawan H, Salam R, Faisal M. Working from home during the corona pandemic: Investigating the role of authentic leadership, psychological capital, and gender on employee performance. Cogent Business & Management. 2021;8(1):1885573.
16. Lopez-Leon S, Forero DA, Ruiz-Díaz P. Recommendations for working from home during the pandemic (and Beyond). Work. 2020(Preprint):1-5.
17. Rainford L, Zanardo M, Buissink C, Decoster R, Hennessy W, Knapp K, et al. The impact of COVID-19 upon student radiographers and clinical training. Radiography. 2020.
18. Shlenskaya N, Karnaukhova A, Son L, Lapteva E, editors. Teachers' burnout in online university courses in the time of pandemic. 2020 The 4th International Conference on Education and Multimedia Technology; 2020.
19. Allen A. Self and Sculptural Transformations: Coping, Burnout, Restoration, Dis/integrated, Dis/comfort, Containment, and Surviving During the 2020 Pandemic. Visual Culture & Gender. 2020;15:68-73.
20. Rodrigues M, Franco M, Silva R. COVID-19 and Disruption in Management and Education Academics: Bibliometric Mapping and Analysis. Sustainability. 2020;12(18):7362.
21. Damiano-Teixeira KM. Managing conflicting roles: A qualitative study with female faculty members. Journal of Family and Economic Issues. 2006;27(2):310-34.
22. Alon TM, Doepke M, Olmstead-Rumsey J, Tertilt M. The impact of COVID-19 on gender equality. National Bureau of economic research; 2020. Report No.: 0898-2937.
23. Rossi R, Socci V, Talevi D, Mensi S, Niolu C, Pacitti F, et al. COVID-19 pandemic and lockdown measures impact on mental health among the general population in Italy. Frontiers in psychiatry. 2020;11:790.

24. Stevenson C, Wakefield JR, Felsner I, Drury J, Costa S. Collectively coping with coronavirus: Local community identification predicts giving support and lockdown adherence during the COVID-19 pandemic. British Journal of Social Psychology. 2020.
25. Barkham M, Bewick B, Mullin T, Gilbody S, Connell J, Cahill J, et al. The CORE-10: A short measure of psychological distress for routine use in psychological therapies. Counselling and Psychotherapy Research. 2013;13(1):3-13.
26. Pohjola V, Kunttu K, Virtanen JI. Psychological Distress, Dental Health, and Dental Fear among Finnish University Students: A National Survey. Int J Environ Res Public Health. 2021;18(19).
27. Duncan C, Rayment B, Kenrick J, Cooper M. Counselling for young people and young adults in the voluntary and community sector: An overview of the demographic profile of clients and outcomes. Psychol Psychother. 2020;93(1):36-53.
28. Mulligan K, McBain H, Lamontagne-Godwin F, Chapman J, Flood C, Haddad M, et al. Barriers to effective diabetes management – a survey of people with severe mental illness. 2018;18(1):165.
29. Yasin B, Barlow N, Milner R. The impact of the Covid-19 pandemic on the mental health and work morale of radiographers within a conventional X-ray department. Radiography. 2021.
30.
31. Krishnan V, Collop NA. Gender differences in sleep disorders. Curr Opin Pulm Med. 2006;12(6):383-9.
32. Deryugina T, Shurchkov O, Stearns JE. COVID-19 DISRUPTIONS DISPROPORTIONATELY AFFECT FEMALE ACADEMICS. 2021.
33. Gulia KK, Kumar VM. Importance of sleep for health and wellbeing amidst COVID-19 pandemic. Sleep Vigil. 2020;4(1):49-50.
34. Wendt D, Shafer K. Gender and Attitudes about Mental Health Help Seeking: Results from National Data. Health & Social Work. 2015;41(1):e20-e8.
35. Rosette AS, Mueller JS, Lebel RD. Are male leaders penalized for seeking help? The influence of gender and asking behaviors on competence perceptions. The Leadership Quarterly. 2015;26(5):749-62.
36. Van Tilburg TG, Steinmetz S, Stolte E, van der Roest H, de Vries DH. Loneliness and mental health during the COVID-19 pandemic: A study among Dutch older adults. The Journals of Gerontology: Series B. 2020.

5. https://covid19.who.int/ accessed 3rd June 2022

30. Chung, H., & Van der Lippe, T. (2020). Flexible working, work–life balance, and gender equality: Introduction. *Social Indicators Research*, *151*(2), 365-381.

Journal Pre-proof

Journal Pre-proof

Acknowledgements

We want to thank the College of Radiographers in the UK for the CoRIPS funding of this project, the EFRS Research Hub for facilitating data collection and the hundreds of radiographers that gave up their time in the middle of a pandemic to support this work. We salute you.

The work was sponsored by a College of Radiographers Industry Partnership Scheme (CoRIPS) research grant.

Data was collected via the European Federation of Radiographer Societies Research hub at ECR 2021.

Journal Pre-proof