

## Publishing Time-Frame Evaluation for Doctoral Students in United Kingdom

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Received: 29 August 2014 / Accepted: 25 September 2014/ Published online: 30 September 2014

### Abstract

The first objective of the study was to compute the time to completion and publication of original scientific publications for medical doctoral students in the UK. A second objective was to evaluate if PhD theses format (monograph or publication-based) can influence the time to completion and publication of original scientific publications. We assessed a small sample of free full text medical doctoral theses from universities in the United Kingdom (mostly from the University of Manchester), which have produced at least 2 original scientific publications by the end of the doctoral studies. The time elapsed between 2 consecutive publications from the same thesis was considered an approximation of the time to completion and publication of the second publication. In the case of prospective theses, the median time to completion and publication of original scientific publications from medical doctoral theses was 10.17 months. We found that there was a statistically significant difference between the time (to completion and publication) medians of the publications from traditional theses format and of the publications from publication-based theses format. Time to completion and publication of original scientific publications for medical doctoral students needs to be further evaluated on a larger scale, based on more theses from several medical faculties in the UK.

**Keywords:** Publication time; Articles; Doctoral studies; Medicine; Scholarly publishing.

### Introduction

When it comes to scientific research, time spent between manuscript submission and its final publication may vary among different journals (range: 31–533 days [1]), journal publishers, and may affect the decision to which journal to submit a manuscript [2]. Time to publication was defined as time from study closure to publication [3]. Most studies have focused on a certain medical field and determined the time to publication for articles published in biomedical scientific journals. For example, clinical trials with positive outcomes were found to have significantly shorter times to publication than those with negative results [3,4]. In ophthalmology, median peer review and publication time was 133 days [5]. On a different note, a study showed that publication lag in biomedical journals varies due to the journal's publishing model. In other words, articles published in the open access mode reached the readers much faster than articles published in printed journals or endorsed by the learned societies or other professional organizations [1]. Moreover, a study tried

to estimate the time between the completion of a scientific research and its publishing in appropriate biomedical scientific journals and found that the time to publication vary from 6 to 12 months in general, but may be longer for some fields [6]. There were few studies aiming at evaluating doctoral students' research output and publication patterns. One study highlighted that research dissemination can be influenced by financial support [7]. The increase of publications at doctoral level was proved to improve in the case of collaborations with more experienced scientists than without their collaboration [8,9] and improve in the case of interdisciplinary research than single discipline research [10]. Another study observed that the number of doctoral publications increased after 2000, doctoral programs may have increased this expectation [11]. According to another study, the time needed to complete a PhD. in the UK was estimated to 3.5 years and the pressure of time to finish it would favor "safer" research subjects instead of more innovating ones [12]. In the last years, many UK universities have introduced new ways for awarding a PhD – this study focusing on "PhD. by Publication" and "PhD. by Published Work" compared to traditional monograph. A "PhD by Published Work" is awarded for the submission of a portfolio of published research, which needs to be at the same standards as a regular PhD. It differs from the more traditional format of a PhD by giving candidates the opportunity to gain formal recognition of the research they have undertaken during their career, before enrollment to doctoral studies. The output of a "PhD by Published Work" is a retrospective thesis. On the other hand, a "PhD by Publication" implies creation of scientific publishable (or published during doctoral studies) papers on the same subject, preceded by a thorough introduction and motivation of choice. The thesis of a "PhD by Publication" is considered prospective and must be comparable to a traditional PhD thesis when it comes to length, rigor and depth of research [13]. The University of Manchester provided students with several forms of PhD to choose from. The "PhD by Published Work" was available only for university employees and offered them a chance to obtain a PhD diploma based on their research publications prior to PhD enrollment. For the university graduates the university offered the traditional format PhD (creating a monograph thesis) or the PhD with "Alternative format" (creating a thesis based on publications elaborated during doctoral studies). The University's Regulations did not demand from doctoral students a certain number of original publications [14]. The first objective of this study was to approximate the time to completion and publication of original scientific publications for medical doctoral students in the UK. The second objective was to compare the median time to completion and publication of original scientific publications for the traditional theses format and median time to completion and publication of original scientific publications for the publication-based theses format.

## **Material and Method**

The official web-site of The University of Manchester Library (<https://www.escholar.manchester.ac.uk>) has been accessed in search for PhD theses. The search strategy was comprised of Academic department= Faculty of Medical and Human Sciences, Content type=Thesis and Publish year= all. All the medical doctoral theses with free text available on-line were downloaded.

The search undertaken on Manchester's library website revealed 73 free text medical theses, mostly from the University of Manchester, but also from other universities as well. This study included 30 theses supported between 2005-2013, which had at least two original publications (accepted or published) by the end of the doctoral studies. 27 theses belonged to the University of Manchester, 1 to the University of London, 1 to St. Catherine University and another 1 to the University of Southampton.

Over the 73 theses identified in search, computing the approximate time to completion and publication of a PhD student's article was possible for 50 published original articles belonging to the 30 theses [15-44].

### *Inclusion and Exclusion Criteria*

Those medical theses supported at non- British universities were excluded.

The publications of interest for this study were original articles, systematic reviews and meta-analysis - published or accepted for publication before the end of doctoral studies. The following were excluded from our analysis: unpublished or unaccepted manuscripts, posters, abstracts, conference proceedings, oral presentations and books.

Theses with 0 or 1 publication of interest were excluded from this study.

### *Method*

All medical free full text PhD theses from UK universities were perused in search of publications of interest. The publications of interest were referred to as “articles” in the rest of the study. They were searched for in the beginning of the thesis or spread across the thesis, easily distinguishable and clearly marked in the text; or in the Contents section. In case they were not found this way, the appendix section of the thesis was examined as well.

For each article were marked: doctoral student’s name, thesis ID, thesis format type (PhD by Published Work, Traditional PhD Format, Alternative PhD Format), PhD awarding institution and the article’s first publication date (oldest version available to the public, regardless if printed or electronic version). The thesis format type was copied from the library’s web-site for each thesis, “Traditional” was a monograph type of thesis, “Alternative” was a prospective thesis by publication, while “PhD by published work” was a thesis comprised of publications previous to doctoral enrollment.

Next, the articles belonging to the same thesis were ordered chronologically, from the oldest to the most recent.

Time to completion and publication of an article was computed based on the presumption that 2 consecutive articles from the same thesis were created and published one after the other. From the chronologically ordered list, the first 2 article dates were chosen, belonging to the oldest article and the next one in line. The time (in months) elapsed between the 2 dates was the time needed to completion and publication for the second article and was registered in the database for that specific article. Next, the second and the third dates of articles were chosen to compute and mark the time needed to completion and publication for the third article. This process was applied until the last article of a thesis, and then the process was recommenced for the next thesis. For the oldest article of each thesis there was no time reference to permit time computation. For example, for a thesis with 2 publications, only the second (newest) article had the time (needed to complete and publish) computed.

Then, from the database were removed all the articles for which the time could not be computed.

Analyzing the time needed to completion and publication for the articles in the database, the average, its 95% confidence interval, the median and quartiles were computed for all the articles, and then they were computed only for articles from prospective theses.

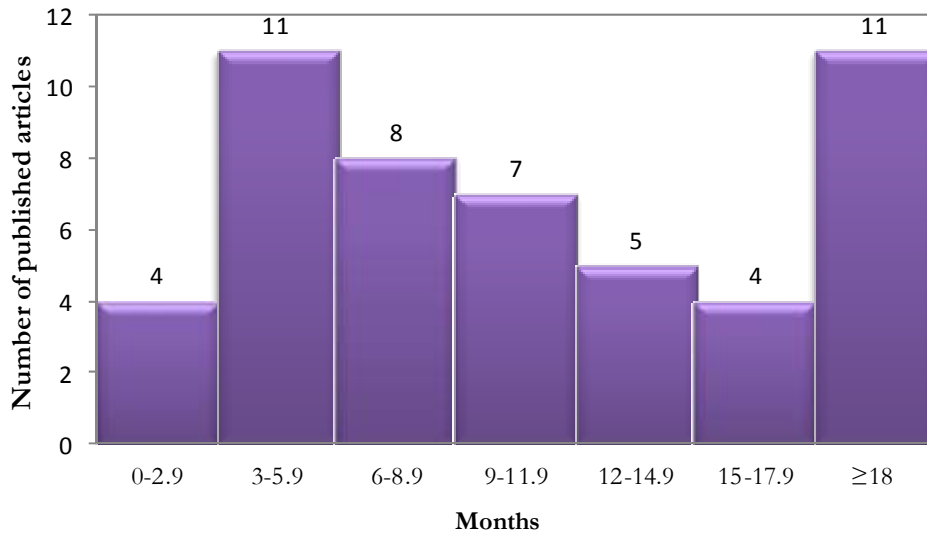
Two groups of articles were formed. One had articles from traditional format theses, the other had articles from alternative format theses. The medians of the 2 groups were computed and then compared using a Mann-Whitney-Wilcoxon test to check if they were statistically different or not. Shapiro-Wilk test was used to test the normality of data.

Microsoft Excel was used to gather initial data and create histograms. SPSS was used to analyze the data, compute means, 95% confidence intervals, medians and quartiles and apply the statistical tests.

## **Results**

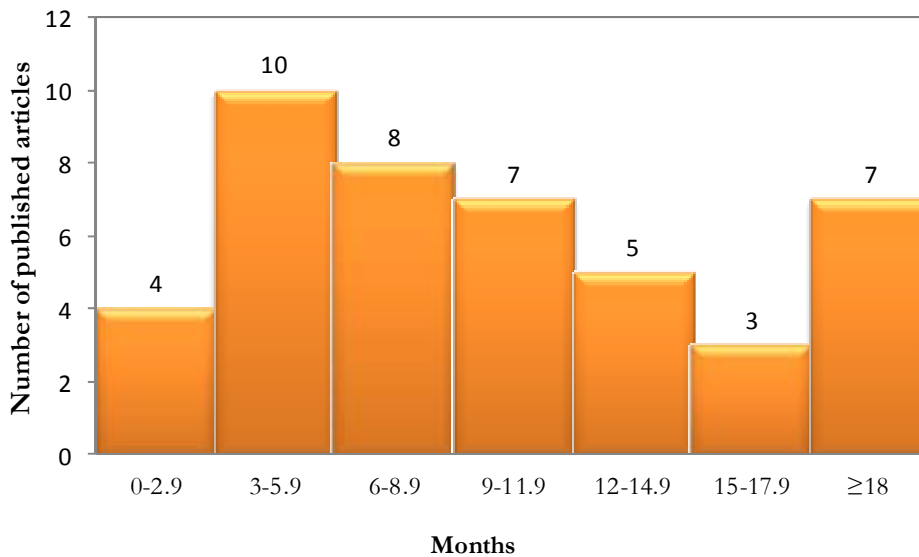
The mean time to completion and publication of an article, comprising all the articles from the 30 these (see figure 1), was 13.88 months (95%CI [9.06–18.70]) and the median time was 9.15 months (Q1=4.06 months and Q3=17.27 months). Shapiro-Wilk test showed that the articles’ time

to completion and publication was not normally distributed ( $p$ -value  $< 0.0001$ ).



**Figure 1.** Distribution of approximate time to completion and publication of a PhD student's article (all theses)

The 3 retrospective theses were excluded from the following analysis. The remaining 27 theses presented 44 articles for which time to completion and publication could be computed. The mean time to completion and publication of an article belonging to prospective theses, based on the data in figure 2, was 10.17 months (95%CI [8.05–12.29]) and the median time to completion and publication was 9.63 months (Q1=4.06 months and Q3=17.27 months).



**Figure 2.** Distribution of approximate time to completion and publication of a PhD student's article (only from prospective theses)

Shapiro-Wilk test showed that the publication time for articles from prospective theses was not normally distributed ( $p$ -value  $< 0.05$ ).

There were 26 articles from alternative format theses and 18 articles from traditional format theses. The median time to completion and publication of an article for the alternative theses format (6.61 months) proved significantly smaller compared to the median time for the traditional

theses format was 11.68 months (Mann-Whitney-Wilcoxon test:  $p=0.025$ ).

## Discussion

This study did a search for medical PhD theses on the official web-site of The University of Manchester Library and found theses belonging to several universities from Europe, other than The University of Manchester. The exclusion criteria limited the theses only to those universities from the UK. According to the Regulations from The University of Manchester, the “Alternative thesis format” had the same characteristics as those of the “PhD by Publishing” found at other UK universities. The Regulations also allowed the “Traditional format thesis” and the “PhD by Published Work”, the latter being a retrospective type of thesis [13,14].

Taking into consideration all thesis formats, this study has found that a medical PhD student had a mean time to completion and publication of an article of 13.88 months (95% CI [9.06–18.70]) and the median time to completion and publication was 9.15 months, far less than a median of 23 months computed in a study on primary medical research [45]. Other studies on publication time did not focus on PhD students, or on time to completion and publication. Their focus was only on time from study closure to publication. A study on clinical trials found that positive results have led to publication in approximately 4 to 5 years, where negative results have taken, on average, a year longer to be published than those with positive results [46]. Similarly, another study found that clinical trials with positive outcomes had a median time of 2.09 years, while clinical trials with negative outcomes had a median time of 3.21 years [3]. Trials with negative findings had a median of 4.2 years, while those with positive findings had a median of 2.2 years [4]. We decided that comparing data from retrospective and prospective PhD theses would bias our analysis since the time to complete and publish an article was one of the main differences of characteristics for the two types of theses. We resumed to analyzing next just the data from prospective articles and then compared alternative and traditional formats, their characteristics being similar from the perspective of time.

The data in figure 2 (articles only from the prospective theses) was not normally distributed (Shapiro-Wilk test:  $p=0.007<0.05$ ). The median time to completion and publication of an article for the alternative theses format was 5 months shorter than in the case of the traditional theses format, approximately 6 months versus approximately 11 months. According to the 44 articles from prospective theses, there was a statistically significant difference between median time to completion and publication for the traditional theses format and the median time to completion and publication for the publication-based theses format (Mann-Whitney-Wilcoxon test:  $p=0.025<0.05$ ). Future studies, on larger and more various samples, should test this hypothesis. If proven true, then doctoral students could knowingly choose the thesis format that would suit them best. The approximation of time to completion and publication of an article could be of high relevance for doctoral students. Considering that full term doctoral studies vary between 3 to 4 years, approximating time to completion and publication could help them plan better their research and create a more realistic plan of publishing manuscripts. The uncertainty in time to publication makes it difficult to schedule and predict the outcome of large research projects. The lag and uncertainty in publication time and the relative uselessness of low-profile publications in promotion and tenure decisions rule out junior faculty or post-docs, though these two groups perform most of the research in the labs of tenured faculty. The amount of time it takes to publish a paper, the number of reviews written, and the difficulty in organizing and comprehending the literature will increase and eventually become a limiting factor on progress in the field, if it is not already [1].

### *Limitations of this Study*

This study was limited due to the lack of time and free access to just the University of Manchester Library. Our results describe the publication trends for mostly doctoral students at the University of Manchester. In future studies we would like to assess articles and theses belonging to several UK universities. This study was based on the presumption that doctoral students conduct

their research and publish their articles one after another, in a cascade fashion. There is a possibility that some doctoral students conducted an ample research which lead to multiple articles, or that they conducted their experiments in the same time frame, in a simultaneous fashion. These facts couldn't be determined solely on the information presented in the theses, but would need the confirmation of the authors for each article. Thus, the time approximation in this study could be further from the truth than we expected. Publication time could be influenced by different factors, of which the study's authors had no means to assess, nor exclude them. For example, social bias was considered a way to hasten the publication of an article. Social bias is when the reputation of one of the manuscript's authors or their affiliation can lead to a faster publication. More precisely, the reviewers do not evaluate the manuscript's contents in relation with the scientific literature regardless of the authors' identities. Some studies have tried to prove that double-blinded reviews have reduced the authors' social bias [47].

## **Conclusion**

Time to completion and publication for medical doctoral students needs to be further evaluated on a larger scale which to include more theses from several medical faculties in the UK.

## **Conflict of Interest**

The authors declare that they have no conflict of interest.

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