

Article

Perish or Publish in China: Pressures on Young Chinese Scholars to Publish in Internationally Indexed Journals

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Abstract: To boost their research productivities, Chinese universities are putting great pressure on their research-active staff to publish in internationally indexed journals. However, the emerging publish-or-perish culture in China has seen little empirical investigation thus far. In the research reported in this article, semi-structured interviews were conducted with seven young researchers in science and engineering disciplines at a research-centered university in central China. The study showed that these young scholars faced great pressure to publish papers in internationally indexed journals. Consequently, the participants were reluctant to spend time on other academic activities, including teaching training. They also reported considerable work time devoted to writing, which resulted in fatigue and negatively affected family relations. The participants admitted that they had to rush to publish, and therefore were less likely to produce papers of better quality or those with novel discoveries. The research contributes to our reflection upon Chinese universities' increasing use of the number of international publications as a major assessment and incentive measurement of their faculties' academic performance.

Keywords: young scholars; internationally indexed journals; perish or publish; China

1. Introduction

This study is set in the context of globalisation. The impacts of globalisation on higher education have been widely discussed. While Altbach [1] rightly warns us of inequality and neocolonialism which globalisation may lead to in the academic world, others note that non-Western countries may actively adopt—rather than passively follow—the Anglo-American model in their efforts to develop their national higher education systems [2]. In line with the latter argument, we see that China, with its recognition of research productivity as central to economic competitiveness, has dramatically increased research expenditure in the past decade [3]. To compete for government funding, Chinese universities, at least the research-centered ones, are now putting great pressure on their research-active staff to publish in journals appearing in the Science Citation Index (SCI) and Social Science Citation Index (SSCI). Such publications have been accepted as indicators of the universities' research strength and closely related to their rankings in league tables. A so-called “publish-or-perish” academic culture, as a result of the Chinese universities' introduction of various evaluation and incentive policies, is now emerging on campuses. The culture particularly affects junior faculty. The number of papers these young scholars publish often determines their career path [4].

The research questions of the study are:

1. What are young Chinese scholars' attitudes towards institutional requirements for publication?
2. How do these attitudes affect their research behavior and personal lives?

In China the institutional pressure to publish in international journals and the consequent impacts on young scholars have attracted much attention in popular media. However, few empirical studies have been conducted on these issues. Using qualitative research methods and with reference to the research questions, the research investigated a group of young Chinese scholars¹'s perceptions towards institutional imperative to publish in internationally indexed journals and how such perceptions affect their research and daily lives. When the study was conducted in the academic year 2014–2015, all participants were on tenure-track contracts with a research-centered university in central China. The sample university is directly administered by the Ministry of Education and has a vision of developing into a world-class university.

2. Research Background: Chinese Competition in Globalised Higher Education

Harvey in *The Condition of Postmodernity* defines globalisation as “time-space compression” [5] (p. 240); somewhat similarly, other sociologists [6,7] consider globalisation as the fundamental transformation of “objective” properties of time and space. The technological innovation represented by instantaneous global communication and mass transportation intensifies this process of “time-space compression” and leads to the ascendancy of the global market over local/national markets. Currently the influences of globalisation have gone beyond the business world and bear with them political, cultural and ideological implications [8]. With reference to the international (in) equality of higher education, globalisation has been criticized as a “trend towards the universalisation of the education practices of Western Anglo-Saxon countries” [9] (p. 2), “synonymous with Westernisation” [10] (p. 9) and reinforcing the hegemonies of “Western institutions, culture and practices” [11] (p. 20).

While recognising this anti-colonial/neocolonialist interpretation, Lo [2] approached the impact of globalisation from a “soft-power” perspective, arguing that China is aware of and actively competing against Western hegemony in higher education. Other researchers' observations backed up Lo's argument, revealing China's determination and efforts to develop its national higher education system and to “reshape the global higher education landscape” [2] (p. 209). Ngok & Guo [12], for example, reported China's strategy of “kejiao xingguo” (*i.e.*, revitalizing China through developing science and education) which led to the launch of the 211 project² in 1995 and 985 project³ in 1998. A more recent policy demonstrating such a determination is the national “twelfth five-year” guidelines on science and technology development [3]. With an overall goal of promoting innovation and original research, the plan targets to increase national research investment to 2.2% of GDP, and to turn China into one of the top five countries in terms of aggregated scientific paper citations⁴ (*ibid*).

With these efforts to enhance international research competitiveness, China has presented a rapid growth in the number of scientific publications in the past decade. Data released by the Chinese Science and Technology Information Institute (CSTII) [13] show that in 2012 international research papers published by authors based in Chinese higher education (HE) institutions amounted to 1.14 million, an increase of 11.8% on the figure in 2011. In the same year, Chinese authors produced 193,733 SCI papers, which is 4 times more than the figure in 2002. In this year, China ranked as the second-largest SCI producer, behind the United States [14]. In 2012, authors from Chinese institutions contributed 187 papers in *Cell*, *Nature* and *Science*, ranking China 9th in the world in terms of publications

¹ This study, following the “new lecturer” policy of the sample university (see Section 4.1), defines young scholars as scholars who are under 35 years old and who work as full time lecturers upon their completion of PhD degree in the university.

² Project 211 is a project initiated in 1995 by Chinese Ministry of Education. 116 universities have been designated as Project 211 institutions. National funding is distributed to these universities to promote their research quality.

³ Project 985 is a project initiated in May 1998 by Chinese Ministry of Education. 39 universities have been designated as Project 985 institutions, to which funding is allocated to promote research reputation and establish “world-class” status.

⁴ The target had already been reached in 2012.

in these three most prestigious journals [13]. China is indeed becoming a global leading actor in scientific publishing.

3. Publish or Perish: Problems behind China's Rapid Expansion of Publications

China's rapid expansion of publications is and has to be realised at the institutional level. In 2012 China evaluated research capacities of 4166 discipline-schools from 363 HE institutions [15]. One important criterion was a school's internationally indexed publications and citations (ibid). In the Academic Ranking of World-Universities (ARWU) annually released by Shanghai Jiaotong University, China, the number of articles published by an institute in *Science* and *Nature* is weighted 20% and the number of articles published in all SCI-Expanded and SSCI journals another 20% [16]. Zhao & Qi [17] compared international competitiveness of 39 Chinese 985 project universities by counting the total number of their SCI, EI and SSCI articles from 2001 to 2014. As such, internationally indexed publications are seen to be serving as "objective" indicators guiding Chinese research-centered institutions as to how "best" research is quantitatively measured.

To boost their research productivities and consequent rankings in different league tables, Chinese universities then pass on this pressure for international publication to academic faculties through the introduction of various evaluation and rewards policies. In the research-centered universities in particular (such as the case reported later in this paper), recruitment, tenure and promotion are increasingly determined by the number of publications an individual has in a selective list of journals relevant to discipline and university rankings [18]. It is also reported that Chinese universities are giving faculty "cash prizes, housing benefits or other perks on the basis of high-profile publications" [19].

Negative consequences of the academic culture promoted by publish-or-perish have been reported by researchers in Sweden [20], Australia and Canada [21], the US [22] and the UK [23]. For example, Alvesson & Sandberg [20] (p. 182) observe a "serious shortage" of imaginative and innovative research in management studies despite a sharp increase of academic publications in the field. Similarly, Adler & Harzing [21] (p. 3) believe that the academic assessment system based on quantitative measurement has pushed researchers away from "genuinely fostering" original knowledge. Another adverse effect of pressure to publish, as identified by Bouchikhi & Kimberly [22], is a growing homogeneity in research, in which researchers tend to report research results in line with dominant paradigms, so as to maximize the acceptance rate of papers (see also [23]). In worst-case situations it is also found that researchers may fabricate data to get their articles published [24]. This observation is supported by Lawrence [25] (p. 10) who declares that the over-emphasised significance of publication "usually reduces the objectivity ... of the arguments", and, eventually, "damage[s] the practice of science".

In China, researchers have started to reflect on the negative impacts of universities using publications output as a major criterion of faculty performance. Lin [26], by referring to Chen Jingrui, a famous Chinese mathematician, and the years Chen spent developing his number theory, argues that the current evaluation system characterised by "work-calculating" (publications-counting) would prevent similar influential discoveries in science. Yao [27] argues that such an evaluation system transforms the function of publication: articles are now serving as "qiaomen zhuan" (i.e., a brick picked up to knock on a door and then thrown away afterwards) for promotion, rewards and pursuit of research funding, rather than a means to share ideas amongst the academic community. More critical reflection is stimulated by reports of recent retractions of Chinese papers (e.g., [28,29]), due to "fabrication, falsification, plagiarism and unattributed ghost-writing" [30]. *The Economist* [31] argues that China's "flawed" research assessment system, over-stressing the number of publications, is responsible for its increasing research misconduct. Similarly, in a recent forum on "safeguarding research integrity in China", hosted by the Chinese National Science Review, Poo, the chair, said that internationally indexed articles, particularly those with high impact factors, could bring about

“instantaneous recognition and honour” and, therefore, encourage Chinese scientists “ . . . to take risks and publish fraudulent papers” [14].

The discussion on China’s publish-or-perish culture is a rather recent phenomenon, and as exemplified by what is reviewed above, is more likely to appear in popular/public media than in academic journals. The criticism usually originates from personal experiences of “insiders” in this culture. Given China’s increasing stress on its research strength, there is an urgent need to empirically investigate the publish-or-perish culture and its impacts on Chinese researchers’ writing and researching practices. This paper is presented as a contribution to meeting that need: it analyses the attitudes of a group of young Chinese scholars on tenure-track contracts at a research-centered university in central China. Data are generated from semi-structured interviews, which allow an investigation of the participants’ perceptions towards the institutional imperative to publish in internationally indexed journals and how such perceptions affect their research and daily lives. This research has chosen young Chinese scholars because this group tends to face the university’s highest expectations of international publication and, hence, is more likely to be affected by the publish-or-perish culture [32].

4. The Study

4.1. Focus and Research Site

This paper, reporting findings from semi-structured interviews, focuses on the participants’ attitudes towards the institutional imperative to publish in internationally indexed journals, and how their professional and personal lives are affected by the attitudes. The fieldwork was conducted at a research-intensive university in central China (henceforth referred to as X University). X University is a multi-disciplinary university; it has a reputation for being strong in sciences and engineering, but is relatively weak in social sciences and humanities. X University is currently sponsored by both the national 211 and 985 projects. Its vision and mission statements include development into “a world-class university” (X University website). In 2012 X University implemented a new lecturer-recruitment policy to “build high-quality teaching faculty” (X University website). The policy required that applicants for lecturer positions must be younger than 35 years old, must hold PhD degrees from domestically or internationally renowned universities, and must reach specified criteria at the end of a three-year contract. The 2012 policy allowed a one-year extension of the contract but failure to reach the criteria within the extra year would lead to termination of contract. In return, X University provided an annual salary package of RMB 85,000; previously the average salary of a lecturer at X University, as set by the Chinese Ministry of Education, was roughly RMB 40,000 per year. In 2013, the University revised the policy by raising the starting annual salary to RMB 120,000 per year. Meanwhile, in this revised version, X University formally announced its adoption of a “tenure-track” system⁵. The 2013 version no longer allows one-year extension of contracts, but job responsibilities remain the same (see Table 1). Any new lecturer appointed in and after 2013 failing to meet the job requirements in three years will not attain tenure, or have the contract renewed. He/she will lose the job. From 2012 to 2015 roughly 400 new lecturers were appointed at X University. Although the tenure-track policy applies to all new lecturers at this university, only those in the sciences and engineering are required to publish in internationally indexed journals (see Table 1 for job specification). Tenure-track lecturers in the humanities and social sciences are required to publish domestically in national core journals.

⁵ In China, the tenure-track system was first introduced by Peking University and Tsinghua University, the top two Chinese universities, in 2003 [33]. So far most 985-project universities and some of 211-project universities have adopted a tenure-track system. Specific contents (e.g., salary, length and performance indicators) of the tenure-track policies adopted by different universities can be very different (ibid). For example, the leading universities, *i.e.*, Peking University and Tsinghua University, are providing much more generous salaries, and some universities, e.g., Shanghai University of Finance and Economics, are using a 6-year tenure track system (ibid).

Table 1. X University's "new-lecturer" contract in the sciences and engineering (2013).

岗位责任与任务目标	Position Responsibilities, Tasks and Targets [Literal Translation]
1. 无海外学习工作经历者...需在聘期内完成连续12个月的海外经历。	1. Anyone who has not studied or worked abroad . . . should have continuous 12-month working experience abroad during the contract.
2. 教学能力要求: 具备教学能力; 取得授课资格; 参加过教学能力培训; 通过教学能力考核; 至少有一次完整的助教经历。	2. Teaching requirements: [Lecturer] must have teaching competence; successfully obtain a teaching qualification; take part in teaching training; pass evaluation of teaching capacity; work as an teaching assistant in at least one course.
3. 科研项目: 主持一项国家级项目。	3. Research project: [Lecturer] must be principal investigator of a national level research project.
4. 论文数量和标准: 以第一作者或通讯作者在国际顶级期刊发表论文1篇; 或以第一作者或通讯作者在最具影响力期刊发表论文2篇; 或以第一作者或通讯作者发表SCI论文5篇。	4. Number of articles and levels: [Lecturer] must have at least one publication in top international journals as the first author or corresponding author; or at least two publications in the most influential journal as the first author or corresponding author; or at least five publications in other SCI journals as the first author or corresponding author. ⁶

4.2. Sampling

The research focused on young scholars who join X University after the implementation of the "new lecturer" policy (see Table 2), and hence are faced with challenges of the emerging publish-or-perish culture in the University. Since only those in the sciences and engineering disciplines are required to publish internationally, we deliberately chose to invite participation from this group only. The process of recruiting participants for the research was not as easy or straightforward as we had expected. X University did not agree to provide staff contacts because of its data protection regulations. We then turned to X University's website which had a link to webpages of academic staff across disciplines. In all, 20 young lecturers' contact details, together with their CVs, were gathered in this way. All of these lecturers were on tenure-track contracts. An email inviting participation, which carefully explained the research aim and purposes, was then sent to each of them; just three volunteered to participate. The fact that most of our emails either received no reply or were politely declined reminded us of the busy schedules these lecturers would have, but also of the possible sensitivity of this research focus. In the subsequent interviews with the volunteers, the building of trust and encouragement was of great importance. Other participants in the research were recruited from colleagues/friends of the first three participants, based on the principle of snowball sampling, or were selected from our personal contacts based on voluntary participation and achieving maximal variation of various characteristics across the sample.

Table 2. Participants in the study.

Code	Gender	Age Group	Discipline	Overseas Study Experience	Year of Employment	SCI Articles Since Joining X Uni.
P1	M	20~30	Mechanic Engineering	None	2015	0
P2	F	30~35	Food Engineer	USA (PhD)	2015	0
P3	M	25~30	Food Engineer	None	2014	3
P4	M	25~30	Mechanic Engineering	None	2014	2
P5	M	25~30	Mechanical Engineering	None	2014	2
P6	M	25~30	Biomedical	Singapore (PhD)	2013	3
P7	M	25~30	Immunology	None	2013	7

⁶ In our email communication, participants explained that "the top international journals" refer to *Nature*, *Science* and *Cell*, and "the most influential journal" refers to the SCI journal with highest Impact Factor in the contract-holder's discipline.

4.3. Data Collection and Analysis

The interviews were conducted in the academic year 2014–2015 after the agreements to participate were received. Before our meetings with the participants, they were invited to answer a short questionnaire via email, in cases where the CV was not available on line. The questionnaire had been designed to meet Cohen & Manion's [34] criteria that the items should be clear, unambiguous and uniformly workable. No open questions were included. This questionnaire was used to gather basic demographic information on gender, age, academic qualifications, experience abroad, date of joining X University, research discipline and number of publications. Consciously excluding such questions from the interviews arose from a concern that the participants might feel awkward if they were asked to answer simple questions one by one in face-to-face interviews [35].

Semi-structured interview was chosen as the major data-gathering resource because it enabled me to clarify research questions [36] and to dig into more detailed answers of complex issues as each interview proceeded and developed in its own idiosyncratic way [37]. A schedule was developed based on the pilot study [32]. It began with the open questions of "Could you describe your experiences of writing for publication?" and "What do you think about the university's requirements of publication in internationally indexed journals?" Emphasis was put on the interviewees' freedom to narrate their perceptions and experiences; participants were encouraged to talk about any issues and concerns they felt were important and relevant to their work, despite our articulated research interest. This avoided restricting the participants' account, so as to reveal in greater depth how they interpreted their experiences and constructed their meanings [38]. Perhaps more importantly, the flexibility in design enabled the interviews to be "... done in a situation of mutual trust, listening, and caring for the experience described by the other" [39] (p. 422), which in turn contributed to the quality of the data generated by the research.

All interviews were carried out in a quiet university coffee shop and all were conducted in Chinese. Each interview lasted 90 to 120 minutes, was recorded and later fully transcribed. Interview data were coded under broad headings such as "previous experiences of writing and publishing", "current pressure for publications", and "impacts of the pressure" that were generated from the original research questions. Sub-categories later emerged as we engaged further with the interview transcripts. In what follows, we use the prefix P1–P7 to refer to the participants. Interview data presented in this paper were translated into English by professional translators, but the original analysis was carried out with the transcripts in Chinese. The original analyses with the transcripts were sent to the participants for comments, which were used to inform any modifications. This process of member checking enhanced the validity of the current research [40].

The commonly articulated weaknesses of a case study are the lack of representativeness of the cases and consequently the limited generalisability of the findings it produces [41]. This point, however, is under debate. Many scholars claim that neither representativeness nor generalisability should be over-stressed in qualitative research. For example, Stake [41] maintains that researchers doing case work attend to unique characteristics of the cases; although readers cannot automatically generalise the findings, they can modify them in the light of their own situations through carefully considering the report. Similarly, Henwood & Pidgeon [42] suggest replacing the notion of generalisability with transferability, and argue that based on a full reporting of case study, the findings could be transferred and applied to contexts similar to the one from which they were originally derived. This argument, moreover, stresses the importance of contextualised study of the cases.

In this research, there were common and recurring themes in the experiences of the participants. It was hoped that the potential for generalisability was increased by examining experiences of several participants, as it is 'reassuring [to] oneself that the events and processes in one well-described setting are not wholly idiosyncratic [43] (p. 157). Moreover, the qualitative design and the use of interviews enabled in-depth investigation of reasons behind the particularity of an individual participant's experiences. By illuminating "how such processes are bent by specific local contextual variations" (ibid), the findings reported here may help others think and design their research to further explore

the publish-or-perish culture. In addition, a detailed report of all stages of this research could enable other researchers to modify and apply the findings based on comparing the situation of this study with that of their own [44]. By these means, this research attempted to exceed the boundaries of the seven participants at X University to shed light on other research.

5. Findings

5.1. Perceived Publication Pressure

To obtain tenure, the participants must have a certain number of publications within three years in specified internationally indexed journals (*i.e.*, SCI journals). When the interviews were conducted, only one participant had produced enough articles (see Table 2). In interviews, all participants said that the pressure to publish was high. There was obviously substantial anxiety brought about by the new “tenure-track” system:

I am pressed for time. I am so pressed for time. Three years five SCI papers; on average one SCI per six months. (P1)

Pressure is certainly there. (P5)

Huge pressure . . . (P6)

Lengthy explanation on their pressure was given by P2 who started the contract with X University in summer 2015 and since then has produced no SCI publication:

How do I feel about the new policy? Nothing but pressure . . . Think about it. It can take two or three months for your paper to be forwarded to reviewers; it can take another two or three months for reviewers to review your papers; and then you may be simply told that your paper is rejected . . . (P2)

Meanwhile, all participants seemed to accept the legitimacy of the new policy. In interviews, one participant referred to the growing competition in the Chinese labor market, as a result of which “every young person in China . . . has to work hard” (P7). Others articulated their awareness of the publish-or-perish pressure in worldwide academia, which they felt made it impossible to challenge. Such observations seemed to help them understand the change and accept the new system:

Assistant professors at XX [a Singapore university] are required to have 30 SCI [papers] within six years. They are faced with tremendous pressure. No publication? Then you go away. (P6)

When my PhD supervisor [in the U.S.A] started his job, he used to call students . . . to push them to do experiments. He said he had to report to the director of research center and to the head of department, and had to submit his progressive reports regularly, so that in the three years' time he could apply for his tenure. My friends said when the new lecturers [in American universities] started their jobs, they all worked like crazy people. There is no difference. (P2)

This [publish or perish] is the reality. As simple as that. No single person can change it; no single nation can change it. (P7)

Moreover, the participants tended to believe that publications in internationally renowned journals could indicate their research capacity fairly. Such an interpretation further reinforced their reconciliation with the new evaluation system and the perceived high pressure for publication. This revealed the dual consequences of the new policy, *i.e.*, the concerns over the potential risk of losing their jobs, but the higher motivation for researching, writing and publishing practices, which may lead to higher research productivity, at least in terms of recognised publications.

How to evaluate scientific research and how to evaluate scientists? We need to explore a better way. But before we find the better way, we should follow the current one. What if there was no evaluation standard? It would take us all back to the 1960s when people in China took food equally from the same big pot [getting an equal share of rewards regardless of the work individuals have done]. If there was no requirement for paper publication, then I wouldn't need to do research, just show up every day in office, right? If there was no such requirement for SCI-indexed publications, lots of low-quality publications would be produced. . . . (P7)

The new policy may potentially help to boost research productivity; also the policy strongly signaled to these young faculty how such publications closely related to, if not determine, their career path. Calling SCI papers “hard currency”, the participants considered those publications essential for surviving and thriving in X University. Solid publication records were essential not only for tenure but also for further promotions.

I would not feel satisfied if I only reached the university's lowest requirement. I need to get as many publications as possible. The more publications, the better chance I have for future promotion. (P3)

More pragmatically, participants were also motivated by the higher salary, whilst they were aware that to gain better job benefits they need tenure. This recognition presented itself as a further source of pressure for publications.

Apparently our salary is higher . . . But the university does not pay for us zhufang gongji jin [the Housing Provident Fund⁷]. The university only pays the housing public accumulation fund for tenured staff. So for us, it is impossible to buy a flat. Buying a flat is too much pressure to us now. (P3)

5.2. Impacts of Pressure for Publication

The previous section presented the participants' comments on the publication-based tenure-track contract implemented at X University, and the consequent publication pressure they experienced. To some extent the participants considered the new system as fair for evaluating their academic performance, which opened up opportunities and motivated them to try to gain upward mobility in academia. However, as the interviews continued, further consequences of this new system were revealed, as discussed below.

5.2.1. Quantity vs. Quality

To satisfy X University's requirements, all interviewees on tenure-track contracts targeted five publications in SCI journals. None of them reported trying to publish two articles in the top SCI journals in their fields, let alone one article in the more prestigious Science, Nature or Cell (see Table 1). Although “Impact Factor . . . may not appropriately demonstrate quality of your research” (P1), they tended to believe that journals with higher Impact Factor were more demanding and accepted only manuscripts of higher quality. Having no choice but to live with the timing of their three-year contract, the participants deemed their chances of getting publications in those top-ranked journals were slim:

Considering the university's policy, I feel to some extent we are forced to 'ji gong jin li' [i.e., chase quick success and instant benefits]. To have a high-quality research article produced, you need time to accumulate [data]. It may take three years, four years or longer. But once you get it done, your findings will have real impacts . . . (P7)

All participants felt they had to sacrifice, to a certain degree, the quality of their research:

⁷ Housing Provident Fund, a long-term housing deposit fund, is an employment benefit provided by employers to individual employees. The fund, using monthly mandatory contributions from both employers and employees, helps employees to purchase and maintain flats.

If there was no such quantitative evaluation, you could do your own work in your own way at your own pace. Then surely all of us would calm down and work on something that is really meaningful. Certainly we would do that. But the reality is the [quantitative] evaluation and we all have to face it. (P6)

For example I have some good findings and I could have written a good paper. But in fact I have to split the findings so as to produce five or six papers. Only by doing so could I satisfy the university's requirement. So you get numbers but not quality. It is a problem. It is a very realistic problem. (P1)

To fulfill this quantitative requirement and secure their job positions, some participants reported writing articles off their PhD research embedded in the dissertation:

What I am doing now is to continue the work I did in the US, to write something out of my PhD study. It is quicker . . . (P2)

Others had to work on new research from the beginning of their contract. The time pressure seemed to discourage these participants from conducting longer-term but potentially more valuable research. The quantitative requirement forced them to produce the required number of international articles, but did not allow them to try to fully explore their academic interests:

People like me, having no data from the [PhD] studies and having to start all over again, must take the fast track. I usually spend half a year on an experiment to get data and another two months on writing up and then submit and immediately after that start another experiment. I would like to do a big one [i.e., research with greater impact], but it needs one or two years or even longer. (P7)

To get publishable papers in the shortest period of time the participants also tended to stick to popular topics and methodologies. Originality is important for success in the competitive world of science; but high pressure to publish discouraged these young scholars from pioneering more challenging research areas (see also [45]). There also arose a concern about ethical issues, particularly objectivity, within the conducting and reporting of the research (see also [24]).

Considering our university's evaluation system, we'd better focus on well-recognised, hotly discussed topics. If your research topic is too new and hasn't aroused mass attention, you will have trouble in publishing. If you cannot have enough publications, you will be eliminated in a few years. (P4)

We call our practices adding water [guan shui, i.e., produce an article with little reading value]. Because usually we just use the same method on different things. We just add water in the pool (laughs). (P6)

A more worrying issue was whether these scholars would be pressured to manipulate and fabricate their data. In our interviews, two participants commented on the writing and publishing practices of medical doctors in X University's affiliated hospitals. It should be noted that the current study generated no further evidence of the truth of the following extracts but these extracts echoed news on research misconduct in China [30,31] and provided a clue as to how high pressure to publish could lead to research fraud:

My colleagues working in hospitals are under much greater pressure than us. They are so busy treating patients, while they also need SCI papers for promotion. They don't have that time. So they have to take more "effective" methods to produce [papers] . . . (P7)

Many of their experiments are done by educational companies. When they get results [from those companies], they ask their students to write papers . . . How can the quality be assured in this way? You ask companies to do your research, and companies are profit-oriented. Who knows whether the results produced by these companies are real or faked? (P6)

5.2.2. Publication vs. Other Academic Obligations

To attain tenure, participants on tenure-track contracts had to fulfill other academic responsibilities (See Table 1). The interviewees reported that they were asked to observe teaching of a chosen course, to work as teaching assistants, to visit a foreign institution for a year (if previously without foreign experience), and to attend different training programs during the contract period:

You not only do your experiments and write papers. You have to teach and have to participate in all kinds of training sessions. We are also supposed to go abroad as visiting scholars for a whole year. (P4)

You have to mark students' homework, you have to give comments, you have to organise tutorials, you have to help sort out their study problems. And after all these you have to design examination papers and mark the examination papers. All this work is on us.

From time to time schools may arrange additional tasks for the participants, ranging from attendance in academic seminars to various administrative and logistical work:

Pretty often the school invited professors to give a talk. To give face to the professors, we are all required to be present in the seminars, even when the talks were not relevant to us and we could not understand them at all. (P6)

Even the staff union in our school assigns work to us. Like every year before the University's sports meeting, the staff union comes to us and says young teachers must participate. (P7)

Participants considered the above-mentioned tasks as irrelevant to and a distraction from their publishing practices. In interviews, they used "meaningless" (P7) "useless" and "very annoying" (P6) to describe the tasks. Under high pressure to produce SCI publications, the participants believed those "irrelevant" tasks were "too many", had reduced their publication productivity, and thus, "should not have been listed in the contract" (P7).

To minimize the perceived distractions caused by such tasks on what they saw as their central task of writing for publication, the interviewees adopted various strategies. P4, for example, managed to gain sympathy from his teaching mentor, who allowed him to skip some of the undergraduate lectures he otherwise had to attend:

The teacher who is supposed to supervise my observation of class teaching is very nice. He understands our pressure. He says, "If you are busy, you can always take a day off. You don't need to sit in every time". (P4)

For those who had to spend a year abroad, a proof of English proficiency was required when applying for financial support from the China Scholarship Council (CSC). To obtain the proof, young faculty could take a six-month weekend English course at a local foreign language university; or they could rely on self-study and try to pass a general English proficiency test, e.g., Public English Test System 5, IELTS, or TOFEL. P7, for example, chose the second option. The tests were known to be harder than sitting in a course. But by taking this option, P7 gained flexibility in managing his English study and research work.

I did not take the course at the foreign language university ... I study English by myself. If you take the course, whole weekends would be occupied ... (P7)

Another document required by CSC for its financial support was an invitation letter from a foreign professor. To get such a letter seemed to be difficult. Having spent a year trying to contact different professors, but failing to persuade any of them to invite him as a visiting scholar, P3 made the following decision:

I am now simultaneously emailing my research proposal to many professors in different universities, even to those whose research is not in my field . . . It is just for an invitation letter. I need an invitation letter as soon as possible. As long as I meet the university's requirement, it will be fine. (P3)

Thus, going-abroad was approached for the sake of going abroad, rather than for broadening horizons, enriching research experiences or building up potential research collaborations. Given the limited time available to satisfy the publication requirement, the participant doubted the necessity and the actual value of the required experiences abroad:

In a recent meeting a senior administrator of the university said, "our target is that within several years all teachers in this university will have at least one-year experience abroad". I don't know why. [Is it] to build a world-class university? But why now? I think it is totally unnecessary. We have only three years and so many papers to publish. This [going abroad] will for sure take some of our time and energy. (P1)

It is compulsory now. I feel this is unnecessary . . . You cannot be so sure that going-abroad will certainly be useful and certainly lead to personal improvement. (P3)

P3's comment was backed up by another interviewee's observation during her study in an American university. According to P2, if Chinese visiting scholars failed to work with a host supervisor with similar research interests who was ready to support their research, the visit would not likely be research-productive:

At my university in the United States, they [Chinese visiting scholars] did not have much to do. . . . In my research field, for example, we must use a lab. If the host professor doesn't provide with the lab facilities, they [Chinese visiting scholars] have to ask to use others' labs. They also need to build their own system for experiments. This can take months. Probably when they get everything ready for experiment, it is about time to leave. This is very common. So going abroad for a year is indeed a waste of time. (P2)

5.2.3. Effects on Physical Well-Being

With high pressure for publication, participants reported working 10 to 15 h a day, 7 days a week. The relationship between overtime work and fatigue has been pointed out in psychology studies [46]. In our interviews "physical tiredness" (*lei*) was repeatedly mentioned by the participants. Fatigue was a negative consequence of the high-pressure to work for publications:

It was exhausting to work for a PhD. When you finally got the degree, you were very very tired. You need a period to recover from it. But our current policy won't allow you the time to buffer against the stress. To be honest with you, I am as exhausted now as I was during my PhD study. (P7)

The consequence of long-term overwork could be much more serious than physical tiredness. In the following extract, P4 emotionally described how his supervisor, a Chinese returnee who had graduated from a prestigious American university, was whole-heartedly devoted to his research work. The supervisor, however, was found dead in his office, at the age of early 50s, of a heart attack, when as usual he was working late at night.

Every day he worked in the office until late at night. Often he asked us to go and discuss revision of paper drafts at 10 p.m. He was revising and we sat beside him so he could tell us how to write in a more appropriate way. There were always such discussions and the discussions always lasted until 2 a.m. and until then we went back home . . . (P4)

The death of his supervisor was a huge shock to P4 and his colleagues. For the very first time these young researchers, who used to be proud of their diligence, realized the significance of health:

We went to hospital together to have a whole body check. It turns out that my stomach has problems, probably because I often did not have meals on time. And my colleagues are physically weak. We all easily catch colds because our immune systems are not strong enough to resist viruses . . . We decided that the research team must play badminton at least once every week. And now I have three meals on time . . . (P4)

Despite the changes in their life style, with the pressure still there, overtime work seemed unavoidable:

Every weekend after taking my English classes, I go home, have dinner and go back to office to work. Time is quite limited . . . My colleagues do the same. We usually didn't leave the lab until 12 p.m. . . . We do not feel it is too much. We do not feel it is hard. We get used to it. (P4)

5.2.4. Work-Family Conflict

Being pressured to work long hours to meet publishing targets, all participants described conflicts between work and family. In the research, six male participants had a stable relationship. Among them all but one had married. For these participants, less "quality time" to spend with their partners appeared to be a common concern:

After dinner if I have an experiment I go to the lab. My wife . . . can understand it. And she has to understand it. . . . That [experiment] is the most important thing. Whatever happens, you must go. (P4)

Before [in our PhD study] we [participant and his wife] were able to go out and socialise from time to time. But now we don't have that time. Because pressure is always there. You have to always keep moving forward, or you will be eliminated. (P1)

All participants observed that obtaining tenure was currently the priority of their family. To support them, their partners took most of the family responsibilities, from cooking and cleaning to caring for older family members.

My girlfriend . . . is living with me. Every day when I am back home, dinner is ready. No longer do I eat in the university canteen. I feel pretty warm . . . (P3)

I feel I am lucky because my wife has always been supporting me. She does all the housework. I don't need to do anything. (P1)

All participants live on campus or close to campus so as to maximize the time spent on research. But this means their partners have to bear inconvenience in their daily commute to work:

She [wife] is working in XX [located at another side of the city]. It is pretty far. She wants to support me. But she has to spend more than one hour commuting to her workplace and more than an hour back. (P4)

To different degrees, the partners sacrificed their own careers to support the participants' work:

I told her [wife] I am working hard so she doesn't need to work that hard. She agrees. Because if both are working hard, who will then look after home and our parents? (P4)

She used to work in the local council in another city. She quit the good job to live with me. She made a great sacrifice. (P3)

Pressure may result in tension within family: the wives of all the married participants were around 30 when the study was conducted and would like to expand their family, while none of the married participants believed the present was a good time to have a child:

My wife and I would like to have baby but we don't have time. (P7)

This thing [having a baby] has to be postponed. Family issues have to be considered later. My wife is not happy about it, but we don't have a choice right now. (P4)

The situation may be particularly difficult for female scholars. The social pressure on females to get married and give birth to children in their 20s is still huge in China [47]. While P2 in this study volunteered to postpone her personal life to meet publication requirements, a friend of her seemed to have no other option:

When a friend of mine went for job interview in X university, the interviewer said straightforward that "you cannot have a baby in the next several years because the research team just won a project"... If she didn't promise, she would not get the job. ... For females, we don't have much choice. The world has never been fair. (P2)

6. Conclusions

To increase its competitiveness in the global knowledge economy, China has targeted further enhancement of its research rigor in a recent plan for science and technology development [3]. This target is being institutionalised in Chinese universities through implementation of various incentive and evaluation policies. In X University where the current study is located a "tenure-track" system has been introduced. The policy promises newly recruited lecturers higher annual salary and opportunities for job promotion largely on the condition of their successfully publishing a certain number of articles in a selective list of internationally indexed journals within a given period of time.

By conducting semi-structured interviews with seven young faculty members in science and engineering disciplines on this tenure-track contract, the study showed that the pressure on these young scholars was extremely high. Our discussions suggested they perceived both positive and negative influences of the new policy. Positively, the participants welcomed the high salary and chances for upward mobility. Considering the policy as an objective evaluation of their research performance, they devoted considerable efforts to writing for publication. Negatively, the participants expressed concerns over time pressure. Racing to meet the tenure requirements, they felt they had insufficient time to produce data of higher quality and consequently produce articles having greater impact. Similarly, to increase productivity, they reported a tendency to work on topics and use methods in line with current norms, rather than risking novel practices that might offer significantly original outcomes. Under huge pressure for publication, the participants were reluctant to spend time on activities apparently less relevant to their publishing practices, including teaching training. The young scholars were pushed to reach short-term targets at the expense of longer-term ones and narrow their career development to merely publishing articles.

These negative consequences of the emerging publish-or-perish culture as observed in this specific Chinese context echo previous criticisms of other HE appraisal systems, such as the Research Assessment Exercise and Research Evaluation Framework in the UK, that are largely characterised by counting numbers of recognised publications [23]. For example, an emphasis on productivity can "come at the expense of innovation, boldness, heterogeneity, and, ultimately, so-called scientific progress" [22] (p. 150). The use of an assessing approach based on "simplistic reductionism" can distort the fundamental purpose of research, *i.e.*, the generation of significant and original ideas using rigorous methods and challenging intellectual engagement to advance human understandings, and the fundamental purpose of academic publications, *i.e.*, the sharing of those ideas to benefit human practices [21].

As such, we suggest that academia reflect critically on the use of "counting" international publications as a major assessment measurement of individual academic performance on tenure-track contracts. The negative consequences of the publish-or-perish culture suggest the use of other approaches to evaluate academic work for the purpose of tenure and promotion. For example, instead of demanding a fixed number of international publications, for tenure and promotion purposes universities can ask the applicants to submit two or three of what they consider to be their most

important publications published during their tenure-track contracts. Applicants should also be allowed to submit a brief report of why they themselves think the publications are important. The report may include Impact Factors of journals and numbers of citations of the submitted publications, but also all other evidence which can potentially indicate the quality, significance and impacts of the publications; for example, peer comments of early versions of the publications disseminated in workshops and conferences, books and research reports, and patents developed based on the same research. The submitted publications, together with the self-evaluation report, are then reviewed and assessed by other academics with recognised reputations in similar research fields. A peer-review assessment is certainly less straightforward, more time-consuming and can be criticised as subjective, but compared to the “number-counting” practice, it can provide a more valid evaluation of research on a range of criteria that may, for example, take into account the professional growth of the researcher and promise of future developments based on the evaluated research. More importantly, it enables young scholars to focus on writing a smaller number of papers of higher quality, and motivates them to commit to innovative but more challenging research. Young scholars are also likely to be encouraged to participate in other academic activities, such as disseminating their research in seminars and conferences or during visits to foreign institutes, as such activities may be considered and rewarded in the peer-reviewed process.

Lastly, tenure track practices and the consequent publish-or-perish culture are recent phenomena in Chinese HE institutions. Empirical research is needed into the actual impacts of such practices on both the quality of research they encourage and on the lives of those researchers expected to carry it out. To further our understanding, we call for both qualitative studies and large-scale surveys of research and writing practices, which should involve faculty of different ages and with different academic positions, and different types of institutions in different regions of China. There is a further, urgent need for studies of gender and publication pressure, as the research reported here only hints at the particular impacts of the publish-or-perish culture on Chinese female scholars. The research has also revealed the considerable extra time spent by the participants on their work as a further consequence of publication pressure, which resulted in fatigue that negatively affected their personal and family relationships. This finding has received little research attention in the past, and further studies are recommended to explore the immediate and long-term effects on the physical and mental wellbeing of Chinese scholars under pressure for publication, and the effects on their personal lives.

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