PhD holders’ working conditions and job satisfaction in Spain: A cross-sector comparison

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Abstract

The present study aimed to compare three job sectors regarding PhD holders’ current working conditions and satisfaction, and whether their working conditions changed after they completed the PhD. We analysed the responses gathered in the survey on the employability of PhD graduates carried out in 2020 by the Catalan University Quality Assurance Agency, AQU Catalunya. Participants were 1,798 PhD holders from all disciplines who graduated between 2014 and 2016 and worked across three job sectors: universities, research institutes and outside academia. Our results offer clear evidence that the working conditions were better for PhD holders working outside academia in terms of the type of contract, working hours and salary, although the connection between their doctoral studies and work is particularly weak. However, we did not find differences in satisfaction with the job content and overall job satisfaction among the three sectors. We also found a clear mismatch between the degree required for the job and the level of responsibilities, not only for PhD holders working beyond academia but also, to a lesser extent, for those working at universities and research institutes. This study contributes to the understanding of academic and non-academic trajectories and points out several gaps and lines for future research and doctoral education.

Introduction

The last decades have witnessed an exponential increase in PhD holders around member countries of the Organization for Economic Co-operation and Development (OECD, 2019). Along with this transformation, there has also been a shift in PhD holders’ careers. While until recently, after graduation, most of them developed academic career trajectories, the number of PhD holders who, either forced or by choice, work in non-academic sectors grows every year (Passaretta et al., 2018). For instance, in the United States, the percentage of PhD graduates employed in non-academic sectors increased from 47.4% in 2010 to 60.4% in 2020 (National Center for Science and Engineering Statistics [NCSES] et al., 2021). In the last decade, non-academic trajectories have also been the majority in several European countries, such as Finland (68%, Törnoos, 2017), the United Kingdom (53%, Boman et al., 2017), and Spain (57.3%, Benito & Romera, 2014).

Even though academic employment is still PhD candidates’ first option (Li & Horta, 2021; Sauermann & Roach, 2012), there are diverse “pull” and “push” factors that influence PhD holders’ career choices towards non-academic sectors (Bloch et al., 2015). On the one hand, academic reforms, successive economic crises, and universities’ neo-liberalism have decreased the possibilities of acquiring a tenure-track position or having a permanent contract (Passaretta et al., 2018). On the other hand, the political and social rhetoric of PhDs as key human capital for knowledge-based economies has broadened the diversity of career prospects and has increased the industry’s interest in employing PhD holders (Diamond et al., 2014; European University Association, 2010), although to a different extent across disciplines (Boman et al., 2021; Passaretta et al., 2018).

Besides those contextual factors, career choices and trajectories are also influenced by PhD holders’ personal characteristics, preferences, strategies, and past experiences (Li & Horta, 2021; McAlpine & Inouye, 2021). Just as career uncertainty and mental health are among the biggest concerns of PhD holders who stay in academia (Lakkoju, 2020; Sala-Bubaré et al., 2022), those who seek non-academic positions often do so in search of job security, better work-life balance and working on real social and political issues (Guerin, 2020; Li & Horta, 2021; Waaijer, 2017).

Leaving academia, however, increases the likelihood of having jobs that do not require a PhD (Germain-Alamartine, 2019; Haapakorpi, 2015; Waaijer et al., 2017) and that are not connected to doctoral training (OECD, 2012). Moreover, studies conducted in the early 2000s suggested that PhD holders working in non-academic positions were less satisfied with their jobs (Bender & Heywood, 2006; Moguéro, 2002). Interestingly, though, this trend might be changing in the last decade. Recent studies in this field show that PhD holders working in non-academic positions are usually satisfied with their jobs (Guerin, 2020; Main et al., 2019).

Working conditions, such as better salaries and permanent positions, play an important role in PhD holders’ satisfaction across different sectors (Bender & Heywood, 2006; Main et al., 2019; Skakni et al., 2022; Waaijer et al., 2017). In Spain, where the present study is focused, two studies explored the differences in satisfaction and work conditions of academic and non-academic PhD holders. Escardíbul & Afcha (2017) explored the determinants of job satisfaction of PhD holders using a national database containing answers from over 4,000 individuals collected in 2009. Their results show that, although working conditions influenced all types of satisfaction (basic satisfaction, e.g., work security, stability, and salary; motivational satisfaction, e.g., career opportunities, work-life balance and autonomy; and overall satisfaction), they were less important for PhD holders working in academia than for those in non-academic sectors (Escardíbul & Afcha, 2017).
These results resonate with those found by di Paolo (2016). Using a database collected in 2011 by the Catalan University Quality Assurance Agency (AQU Catalunya), the author found that PhD holders working in non-academic sectors were more satisfied with their working conditions (e.g., salary and permanent positions) than those remaining in academia. The study also showed that PhDs working in non-academic sectors tended to be less satisfied with the content of their job and their job skills match (di Paolo, 2016).

These studies have been crucial to challenging the popular belief that sees non-academic careers as failed academic careers (Guerin, 2020) and shedding light on the careers of PhD holders in non-traditional tracks by exploring their satisfaction with different aspects of their work and comparing them across sectors. However, these studies were conducted more than one decade ago. Given the rapid changes in the national and global academic and non-academic sectors (Passaretta, et al., 2018; Ramos & Rayuela, 2017; Santos & Horta, 2015), such as increased precarity in academic jobs and higher research, development and innovation (RDI) investment in non-academic sectors (Loher et al., 2019; OECD, 2021; OECD, 2022), the situation depicted by these studies might have changed. Moreover, apart from exploring PhD holders’ current satisfaction and working conditions, it is interesting to know whether and how working conditions have changed since graduation and whether these changes are linked to their employment sector. Thus, in the present study, we explore the perceptions of PhD holders who graduated in Catalonia about different aspects of their working conditions, whether they changed since graduation, and job satisfaction in relation to PhD holders’ job sector (i.e., academia, research institutes and outside academia). Specific objectives were:

1. Exploring differences in the current working conditions in regard to the sector in which PhD holders are currently working.
2. Exploring differences in satisfaction with the current job in regard to the sector in which PhD holders are currently working.
3. Exploring differences in the impact of the doctorate on PhD holders’ current jobs in regard to the sector in which PhD holders are currently working.

Method

Context

The study is situated in Catalonia, a northeast region of Spain, whose capital is Barcelona. This region is a pioneer in economic production within Spain. It ranked second in domestic RDI investment expenditure and first in hosting RDI companies (Instituto Nacional de Estadística [INE], 2022a; INE, 2022b) in 2021.

Catalonia is also a leading region in university efficiency and PhD training (Buela-Casal et al., 2015). In 2020, Catalonia was the Spanish region with the highest number of theses defended, according to the last database of doctoral studies provided by the Spanish Government (INE, 2022c)

The doctoral population in Catalonia experienced incremental growth in the first half of the previous decade, reaching its highest peak in 2015–2016 with 3,741 theses defended. Since then, the number of defended theses per year has stabilised at around 2,200 (Idescat, 2022). Among the candidates who graduate each year, around 50% are women and 37% are foreign-born (AQU Catalunya, 2020).

This stabilisation trend coincides with a significant modification of Spanish regulation of PhD education in accordance with the European Higher Education Area framework development and the subsequent Bologna Declaration (AQU Catalunya, 2020), which resulted in the new Spanish national doctoral regulation (Real Decreto, 99/2011). The Regulation specified changes in the structure of doctoral education with research centres or doctoral schools as responsible for ensuring doctoral programme coordination. The new Regulation also modified the doctoral studies duration. Since then, the doctoral studies’ maximum duration is three (full-time) or five years (part-time), between the candidates’ admission and the doctoral thesis defence. Compulsory courses were replaced by individualised training plans to ensure that candidates acquire desired competencies through seminars, workshops, courses, conferences, or work in research teams. Mobility is included as part of the formative activities and all doctoral students are highly encouraged to undertake short internships abroad according to specific research interests and projects.

Other related changes address programs’ formative assessment by both the University (through the Internal Quality Assurance units) and the government (through the external peer-based cyclical quality assessment process carried out by the university agencies such as AQU Catalunya (AQU, 2020).

Dataset
This study analysed the responses gathered in the survey on the employability of PhD graduates carried out in 2020 by the AQU Catalunya. Since 2008 and every three years, the survey assesses the employability of PhD holders. Doctorates who graduated between four and five years before from all Catalan universities are interviewed by telephone using a Computer-assisted personal interviewing system. They are mainly asked about the characteristics of PhD holders’ doctoral training and current job and their satisfaction with these aspects. The full instrument can be accessed at https://www.aqu.cat/doc/doc_32625909_1.pdf

According to official data (Idescat, 2022), between 2014–2015 and 2015–2016, 6,177 candidates obtained a doctoral degree. The dataset contains answers from 2,203 PhD holders, which represent 35.66% of the total population, a very high percentage given that the interview took place around four years after graduation and that PhD holders are a particularly mobile population (Ramos & Royuela, 2017). For this study, we selected only those who were based in Spain (most of them in Catalonia) at the time of the interview (n = 1,798). This was done for two reasons. First, working conditions, a critical objective of the study, are highly dependent on the national context. Second, as PhD holders were interviewed over the phone, it is plausible to assume that the PhD holders working in a different country are underrepresented in this sample as they are more likely to have changed their phone number since they graduated.

Thus, the final dataset included 1,798 responses from PhD holders who graduated in 2014–2015 and 2015–2016 and were currently based in Spain. At the time of the interview (2020), their mean age was 40.2 (SD = 7.95), and 55.6% were women. Participants were distributed among all disciplines, with Health Sciences being the most prevalent discipline (32%), followed by Social (19.7%) and Experimental Sciences (19.1%), Technology (16.3%) and Humanities (12.5%). The remaining 0.3% were ascribed to mixed studies.

Most of the participants (60.5%) were working outside academia, around one-quarter were working at a university (24.5%), and the rest (15.1%) were working in a research institute.

The variables of interest are related to PhD holders’ sociodemographic characteristics (gender, age, job sector and discipline), current working conditions (i.e., education, PhD functions, working hours, type of employment contract, and salary), satisfaction with their current job (satisfaction with the job content, promotion opportunities, salary, job-skills match, and the overall job satisfaction), and the impact of the doctoral degree in their current job (job change, improvement in the type of contract, increase in the salary and the working hours, new responsibilities, and leadership). Questions about current working conditions were single-answer multiple choice questions with a different number of options, whereas those about satisfaction were Likert-type scales ranging from 1-strongly disagree to 7-strongly agree. Regarding questions about the impact of the doctoral degree on their current job, the first four questions were single-answer multiple choice questions, and the last two were Likert-type scales (range 1–7).

To better understand PhD graduates’ employability, we compared these variables across employment sectors. In this dataset, employment was classified into three sectors, namely “universities”, “research institutes” and “companies or other institutions” (hereafter referred to as “outside academia”)1, which includes diverse organisations (e.g., businesses, non-governmental organisations, and public administration). Although some studies put universities and research institutes together as academic career institutions (e.g., Barjak & Es-Sadki, 2016; Coccia et al., 2015), we maintained the three-sectors classification for several reasons. First, in Catalonia, research institutes are institutionally defined as separate entities (Departament de Recerca i Universitats, 2022). Also, there are big differences between research institutes and universities in terms of funding, culture, working conditions, and job functions. Research institutes tend to have interdisciplinary and multidisciplinary structures, be composed of different types of organisations, and are supported by public, private, or mixed financial resources, even being driven and participated by public funds. Beyond publication results, their structure facilitates applied outcomes in the professional field and significant technological innovation. Although researchers in these institutes may have teaching functions, this is not the case for most of them, and when it occurs, it appears to be a secondary function. The classification of research institutes has been challenging for the scientific community due to their diversity according to factors associated with the areas of knowledge, their main activity, or the organisations of which they are composed (Ortega et al., 2011). Therefore, in view of their complexity and variability, we have chosen to maintain the AQU’s classification.

**Data analysis**

Besides descriptive analyses of the variables of interest, we conducted statistical tests to identify the differences among job sectors and compare the answers of the three groups: universities, research institutes and outside academia. More specifically, we conducted Pearson's Chi-square tests to assess statistically significant relationships between the job sector and the nominal
variables included in this study (education; PhD functions; working hours; type of employment contract; salary; job change; improvement on type of contract; salary improvement; and working hours increase). Additionally, we used V Cramer to assess the effect size and corrected standardized residuals to identify significant divergence from the expected frequency.

In turn, we conducted Kruskal-Wallis tests to explore associations between the job sector and the rest of the variables of interest (all those related to satisfaction with the current job, and new responsibilities and leadership variables). Mann Whitney's U was performed to explore differences between each pair of job sector groups. Non-parametric options were chosen because most of the variables did not meet ANOVA's assumption of homogeneity of variance.

1 We are aware this term is not without problems. Given the diverse nature of the organizations included in this group, it is difficult to find an affirming inclusive term. Also, this is a widely used term in the literature on PhD holders' trajectories (see, for instance, Bloch et al., 2015; McAlpine & Inouye, 2022; Passaretta et al., 2018).

Results

Descriptive results

Regarding the current working conditions of the whole sample, most participants had full-time jobs (83.6%), and a majority had a permanent contract (58.6%), while some had fixed-term contracts (27.1%). The annual salary was up to 15,000€ for 9.6% of participants, between 15,000 and 30,000€ for 35% of them, between 30,000 and 50,000€ for 39.8% of the sample and more than 50,000€ for 15.7% of them.

Regarding the connection between the job and the PhD, the majority of participants had PhD functions (52.3%). However, only 29.5% said the PhD was required in their job, whereas 55% mentioned that a specific university degree related to the job was needed, 10% needed any university degree, and 5.5% had a job that did not require a higher education degree. Despite only a few participants having jobs that require a PhD, 50.8% of the sample perceived having PhD functions.

As for satisfaction with the current job, table 1 shows the mean and standard deviation of the five items related to satisfaction with the current job. As seen, participants are generally more satisfied with the content of their job and less satisfied with the salary.

Table 1. Satisfaction with the current job.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction with job content</td>
<td>6.09</td>
<td>1.05</td>
</tr>
<tr>
<td>Promotion opportunities</td>
<td>4.91</td>
<td>1.76</td>
</tr>
<tr>
<td>Salary satisfaction</td>
<td>4.83</td>
<td>1.58</td>
</tr>
<tr>
<td>Job-skills match</td>
<td>5.04</td>
<td>1.74</td>
</tr>
<tr>
<td>Overall satisfaction</td>
<td>5.75</td>
<td>1.11</td>
</tr>
</tbody>
</table>

Regarding the impact of the PhD on the current job, less than half of the participants (43.3%) experienced a job promotion after completing the doctoral degree. However, the type of contract was improved for a higher percentage (56%), for example, by moving from a fixed term to a permanent job. For 61.9% of the participants, the salary was improved, while only one-third of the participants (33.4%) increased the number of working hours. Medium levels of impact were found in terms of assuming new responsibilities (M = 4.43, SD = 2.06) and leadership (M = 4.19, SD = 1.99).

Comparison across sectors

In the following subsections, we detail the results of the comparison across sectors considering first the participants' working conditions, then satisfaction and finally the impact of the PhD in their current job.

Differences in current working conditions
Regarding education, a PhD degree was notably less required for PhD holders working outside academia (12.7%), than for those working at universities (44.7%) and research institutes (46.1%). However, the specific disciplinary degree was more required for PhDs holders working outside academia (69.4%), than for PhDs working at universities (39.5%) and at research institutes (41.7%) ($\chi^2 (2) = 271.84$, Cramer’s $V = .43$, $p < .001$).

A significant relationship was found between having PhD functions and the professional sector ($\chi^2 (2) = 333.2$, Cramer’s $V = .43$, $p < .001$). PhD holders working outside academia were less likely to have PhD functions (33.5%) than those who work at university (79.5%) and at research institutes (73.8%).

The type of employment contract was also significantly related to the job sector ($\chi^2 (6) = 609.38$, Cramer’s $V = .58$, $p < .001$). Participants working outside academia were much more likely to have a permanent contract (75.8%) and to be self-employed (13.2%) than those working at universities (permanent: 12.8%, self-employed: 1.4%) and research institutes (permanent: 11.4%, self-employed: 1.9%). Scholarships were almost exclusively held by university employers. Similarly, although the majority of participants had full-time jobs, PhD holders working outside academia (87.8%) and in research institutes (92.3%) are more likely to have such full-time positions than those working at universities (58.6%) ($\chi^2 (2) = 153.16$, Cramer’s $V = .31$, $p < .001$).

Finally, there was also a statistically significant relationship between the participants’ professional context and their salary ($\chi^2 (2) = 161.37$, Cramer’s $V = .22$, $p < .001$). PhD holders working outside academia were much more likely to be at the highest salary level, while those working in research institutes were more likely to be in the medium salary levels and PhD holders working at universities were more likely to be in the low-medium salary levels (see Table 2).

Table 2. Comparison of PhD holders’ current working conditions in relation to their job sector.
<table>
<thead>
<tr>
<th>Sector</th>
<th>Universities</th>
<th>Research institutes</th>
<th>Outside academia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PhD</td>
<td>213 (48.4%)</td>
<td>125 (46.1%)</td>
<td>138 (12.7%)</td>
</tr>
<tr>
<td>( z = 12.0 )</td>
<td>( z = 8.0 )</td>
<td>( z = -16.4 )</td>
<td></td>
</tr>
<tr>
<td>Specific university degree</td>
<td>174 (46.1%)</td>
<td>113 (41.7%)</td>
<td>754 (69.4%)</td>
</tr>
<tr>
<td>( z = -9.0 )</td>
<td>( z = -5.9 )</td>
<td>( z = 12.2 )</td>
<td></td>
</tr>
<tr>
<td>Any university degree</td>
<td>40 (9.1%)</td>
<td>20 (7.4%)</td>
<td>71 (6.5%)</td>
</tr>
<tr>
<td>( z = -0.9 )</td>
<td>( z = -1.7 )</td>
<td>( z = 2.0 )</td>
<td></td>
</tr>
<tr>
<td>No university degree</td>
<td>13 (30%)</td>
<td>13 (4.8%)</td>
<td>71 (6.5%)</td>
</tr>
<tr>
<td>( z = -2.6 )</td>
<td>( z = -0.5 )</td>
<td>( z = 2.6 )</td>
<td></td>
</tr>
<tr>
<td><strong>PhD functions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>350 (79.5%)</td>
<td>200 (73.8%)</td>
<td>364 (33.5%)</td>
</tr>
<tr>
<td>( z = -13.9 )</td>
<td>( z = 8.2 )</td>
<td>( z = 18.2 )</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>90 (20.5%)</td>
<td>71 (26.2%)</td>
<td>723 (66.5%)</td>
</tr>
<tr>
<td>( z = -13.9 )</td>
<td>( z = -8.2 )</td>
<td>( z = 18.2 )</td>
<td></td>
</tr>
<tr>
<td><strong>Type of employment contract</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent</td>
<td>134 (30.7%)</td>
<td>120 (44.4%)</td>
<td>799 (73.8%)</td>
</tr>
<tr>
<td>( z = -13.8 )</td>
<td>( z = -5.2 )</td>
<td>( z = 16.0 )</td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td>6 (1.4%)</td>
<td>5 (1.9%)</td>
<td>140 (13.2%)</td>
</tr>
<tr>
<td>( z = -6.1 )</td>
<td>( z = -4.2 )</td>
<td>( z = 8.5 )</td>
<td></td>
</tr>
<tr>
<td>Temporary</td>
<td>209 (47.5%)</td>
<td>135 (50%)</td>
<td>143 (13.2%)</td>
</tr>
<tr>
<td>( z = 11.0 )</td>
<td>( z = 9.1 )</td>
<td>( z = -16.4 )</td>
<td></td>
</tr>
<tr>
<td>Scholarship</td>
<td>90 (20.5%)</td>
<td>10 (3.7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>( z = 15.6 )</td>
<td>( z = -1.5 )</td>
<td>( z = -12.7 )</td>
<td></td>
</tr>
<tr>
<td><strong>Working hours</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>160 (58.6%)</td>
<td>241 (92.3%)</td>
<td>952 (87.8%)</td>
</tr>
<tr>
<td>( z = -12.2 )</td>
<td>( z = 4.2 )</td>
<td>( 6.5 )</td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>113 (41.4%)</td>
<td>20 (7.7%)</td>
<td>132 (12.2%)</td>
</tr>
<tr>
<td>( z = 12.2 )</td>
<td>( z = -4.2 )</td>
<td>( -6.5 )</td>
<td></td>
</tr>
<tr>
<td><strong>Salary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 15,000€</td>
<td>68 (16.5%)</td>
<td>10 (3.9%)</td>
<td>83 (8.2%)</td>
</tr>
<tr>
<td>( z = 5.5 )</td>
<td>( z = -3.4 )</td>
<td>( z = -2.4 )</td>
<td></td>
</tr>
<tr>
<td>15,000-30,000</td>
<td>175 (42.5%)</td>
<td>115 (44.7%)</td>
<td>299 (29.4%)</td>
</tr>
<tr>
<td>( z = 3.7 )</td>
<td>( z = 3.6 )</td>
<td>( z = -5.9 )</td>
<td></td>
</tr>
<tr>
<td>30,000-50,000</td>
<td>152 (36.9%)</td>
<td>124 (48.2%)</td>
<td>394 (38.8%)</td>
</tr>
<tr>
<td>( z = -1.4 )</td>
<td>( z = 3 )</td>
<td>( z = -1 )</td>
<td></td>
</tr>
<tr>
<td>More than 50,000</td>
<td>17 (4.1%)</td>
<td>8 (3.1%)</td>
<td>240 (23.6%)</td>
</tr>
<tr>
<td>( z = -7.4 )</td>
<td>( z = -6 )</td>
<td>( z = 11 )</td>
<td></td>
</tr>
</tbody>
</table>

Differences in satisfaction with the current job

Satisfaction differences among groups relate to salary (\( \chi^2 (2) = 41.5, p < .001 \)), promotion opportunities (\( \chi^2 (2) = 49.37, p < .001 \)), and the job-skills match (\( \chi^2 (2) = 97.02, p < .001 \)). Specifically, PhD holders working outside academia were more satisfied with their
salary than those working at universities (U = 186188, p < .001) and research institutes (U = 110164, p < .01). Similar differences were found in relation to promotion opportunities: PhD holders working outside academia mentioned being more satisfied with their promotion opportunities than those working at universities (U = 191578, p < .001) and at research institutes (U = 97650.5, p < .001). Differences were also statistically significant between these two groups (U = 4893, p < .01), with PhD holders working at universities being more satisfied with such opportunities than those working at research institutes.

In contrast, PhDs working outside academia were less satisfied with the job-skills match than those working at universities (U = 167575, p < .001) and research institutes (U = 95446, p < .001) (see Table 3). No significant differences were found regarding the level of satisfaction with job content and overall job satisfaction.

Table 3. Satisfaction with the current job by sector.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Universities</th>
<th>Research institutes</th>
<th>Outside academia</th>
<th>KW</th>
<th>MWU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction with job content</td>
<td>6 (1-7)</td>
<td>6 (1-7)</td>
<td>6 (1-7)</td>
<td>.153</td>
<td></td>
</tr>
<tr>
<td>Promotion opportunities</td>
<td>5 (1-7)</td>
<td>5 (1-7)</td>
<td>6 (1-7)</td>
<td>49.37*</td>
<td>OA &gt; U* &gt; I*</td>
</tr>
<tr>
<td>Salary satisfaction</td>
<td>5 (1-7)</td>
<td>5 (1-7)</td>
<td>5 (1-7)</td>
<td>41.5*</td>
<td>OA &gt; U* &amp; I*</td>
</tr>
<tr>
<td>Job-skills match</td>
<td>6 (1-7)</td>
<td>6 (1-7)</td>
<td>5 (1-7)</td>
<td>97.02*</td>
<td>OA &lt; U* &amp; I*</td>
</tr>
<tr>
<td>Overall satisfaction</td>
<td>6 (1-7)</td>
<td>6 (1-7)</td>
<td>6 (1-7)</td>
<td>7.96</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: Md, Median, U, Universities, I, Research Institutes, OA, Outside Academia, KW, Kruskal-Wallis test, MWU, Mann-Whitney U test. * p < .01

Differences regarding the impact of the doctoral degree

Differences among sectors were also found regarding the impact of the PhD graduation on participants’ working conditions (see Table 4). PhD holders working at research institutes were slightly more likely to change jobs after completing the PhD (52.9%) than those working outside academia (41.4%) (χ² (2) = 9.18, Cramer’s V = .08, p < .05). In turn, those working outside academia were less likely to improve the type of contract (50.7%) than those working at universities (64.8%) and research institutes (68.6%) (χ² (2) = 40.15, Cramer’s V = .168, p < .001).

PhD holders across sectors also differ in the impact of PhD on salary increase (χ² (2) = 40.06, Cramer’s V = .168, p < .001). While 55.6% of PhD holders working outside academia had increased their salary since graduation, this percentage rose to 69.5% and 75.7% for those working at universities and research institutes, respectively.

We also found differences among groups in regard to the working hours increment (χ² (2) = 37.67, Cramer’s V = .163, p < .001), with PhD holders at universities more likely to experience an increase (45.2%), and those working in a research institute more likely to have not increased their working hours (79%).

Table 4. Comparison of PhD holders’ current working conditions in relation to their job sector.
Regarding PhD holders’ professional roles, the analysis also showed differences among groups in the impact the doctorate had on the assumption of new responsibilities ($\chi^2 (2) = 79.56, p < .001$) and on leadership ($\chi^2 (2) = 46.28, p < .001$) (see Table 5). Mann-Whitney’s U tests showed that PhD holders working outside academia perceived less impact of the doctorate in the assumption of new responsibilities than those working at universities ($U = 106710.5, p < .001$) and at research institutes ($U = 433235.5, p < .001$). Similarly, PhD holders working outside academia perceived less impact of the PhD in the current job on leadership than those working at universities ($U = 111411, p < .01$) and at research institutes ($U = 64630, p < .001$). No differences were found between these last two sectors.

Table 5. Comparison of changes in PhD holders’ roles after graduation.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Universities</th>
<th>Research institutes</th>
<th>Outside academia</th>
<th>KW</th>
<th>MWU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Md (min-max)</td>
<td>Md (min-max)</td>
<td>Md (min-max)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New responsibilities</td>
<td>5 (1-7)</td>
<td>6 (1-7)</td>
<td>5 (1-7)</td>
<td>79.56*</td>
<td>OA &lt; U* &amp; I*</td>
</tr>
<tr>
<td>Leadership</td>
<td>5 (1-7)</td>
<td>5 (1-7)</td>
<td>4 (1-7)</td>
<td>46.28*</td>
<td>OA &lt; U* &amp; I*</td>
</tr>
</tbody>
</table>

Abbreviations: Md, Median, U, Universities, I, Research Institutes, OA, Outside Academia, KW, Kruskal-Wallis test, MWU, Mann-Whitney U test. * $p < .01$

**Discussion**

The present study aimed to compare three job sectors regarding PhD holders’ current working conditions and satisfaction, and whether their working conditions changed since they completed the PhD. Our results showed that for most PhD holders working beyond academia (e.g., in companies), the PhD was not a requirement, as previous studies had found in similar and different contexts (Germain-Alamartine, 2019, Haapakorpi, 2015, Waaijer et al., 2017). However, unexpectedly, results also revealed that a
non-negligible proportion of those working at universities and research institutes were not required to have a PhD either. This surprising result might be partially explained by the fact that, in Spain, official data shows that less than half of the faculty hold permanent positions (Ministerio de Ciencia, Innovación y Universidades, 2019) and approximately 32.6% hold “fake” adjunct professors (falsos profesores asociados in Spanish). These positions were originally meant for qualified professionals teaching specific courses at university, with part-time contracts and no requirement to have a PhD. Precarity has resulted in those positions being occupied by postdocs who usually need to carry on with (unpaid) research tasks if they want to publish and increase their chances of getting a permanent tenure-track position in academia. These findings also relate to overqualification, a very extended issue in the Spanish labour market (Capsada-Munsech, 2019).

Results also showed a clear mismatch between degree requirements and level of responsibilities, from the participants’ point of view. For all three sectors, the number of individuals doing PhD-level functions is clearly superior to those who were required to have a PhD, especially in the university sector. These findings resonate with those of others (Germain-Alamartine, 2019, Haapakorpi, 2015, Purcell, et al., 2005). The explanation, however, remains unclear. It might be that PhD holders bring more to the job than they are required (Haapakorpi, 2015) or that employers do not have a clear idea of what PhD holders can bring to a given job. In any case, these results point to the need, on the one hand, to unpack what PhD-level tasks mean and, on the other hand, to raise awareness about the value that PhD holders can add to non-academic sectors (McAlpine & Inouye, 2021). Results add to the piling evidence on the drop in the quality of academic jobs (Loher et al., 2019, OECD, 2021) and might also be taken into account to rethink how doctoral education in Spain helps candidates to design their postdoctoral career trajectories.

On the other hand, in line with previous studies (di Paolo, 2016, Germain-Alamartine, 2019, Waaijer et al., 2017), results offer clear evidence that the current work conditions were better for PhD holders working outside academia in terms of the type of contract, working hours and salary. Better working conditions are among the most common motivations given by PhD holders to take non-academic positions (Guerin, 2020, Li & Horta, 2021).

Consistently, PhD holders who worked outside academia were more satisfied with the contractual aspects of their job and with their chances for promotion, while those in academia are more satisfied with the connection between the skills learnt during their PhD and their current job (Germain-Alamartine, 2019, Waaijer et al., 2017). These results pointed out, again, that the connection between PhD holders’ training and work is particularly weak in non-academic sectors. Interestingly, however, this lack of connection does not seem to undermine PhD holders’ satisfaction with the job content, as our results depicted similar levels of satisfaction with the job content and overall satisfaction among PhD holders in the three sectors.

Overall, this study shows that it is possible for PhD holders to have fulfilling and satisfying careers outside academia. This finding is particularly relevant to fight popular narratives of non-academic careers as failed careers (Guerin, 2020), especially given the rising number of PhD holders who, by force or choice, end up working outside academia (NCSES et al., 2021, Passaretta et al., 2018, Törnoos, 2017). Moreover, findings also suggest that PhD holders in each sector might have different career preferences and value distinct aspects of their jobs (di Paolo, 2016, Li & Horta, 2021, Sauerman & Roach, 2012, Waaijer, 2017).

Finally, results also suggest some differences among sectors regarding the impact of the doctorate on PhD holders’ jobs. In general, participants working outside academia were less likely to experience significant changes after their graduation, both in terms of improvement of working conditions and responsibilities. These results are particularly surprising as this group reported the best working conditions among the three sectors. One plausible explanation is that most PhD holders working outside academia after their PhD were already employed in their workplaces before graduation and that their working conditions during their PhD were better than those of the PhD holders who ended up working in research institutes and universities. It might be that these non-academic PhD holders were already happy with their jobs and did not look for a change after obtaining the PhD. However, even though graduation did not seem to have a significant impact on PhD holders working outside academia, it remains unclear whether their training as researchers had an impact before graduation (e.g., getting a promotion or higher level of responsibilities based on skills acquired during the PhD instead of based on the graduation itself).

This study is not without limitations. Data used in this article was collected before the Covid-19 pandemic. Given the rampant crisis the pandemic has triggered, further exploration of these issues might be needed in the coming years. Moreover, the topics explored here (i.e., working conditions, satisfaction with the job and impact of the degree on the job) are all complex and multifaceted issues. Although we believe this paper makes a valuable contribution to better understanding PhD holders’ work situation across contexts and sectors four years after graduation, each of these issues should be explored in greater depth to fully understand the motives,
issues and challenges underlying differences among sectors. For instance, satisfaction with the current job might be affected by other non-monetary job attributes or incentives, such as time flexibility, intellectual challenge, prestige, peer recognition and contribution to society (di Paolo, 2016, Skakni, et al., 2022), which are not explored in this paper. Future studies should also explore how PhD holders’ trajectories, motivations and satisfaction evolved through time and career decisions.

Moreover, the impact of the doctorate on PhD holders’ professional careers far exceeds the contractual conditions and may include more intangible changes, such as improved competencies and better personal life and work balance. Further studies could explore the influence the PhD had during training and after graduation in these and other issues. Finally, the consideration of doctoral-level tasks is also a fuzzy notion that must be unpacked to understand what different stakeholders—employers, employees and even researchers—mean when using it in different contexts and sectors.

To sum up, this study contributes to the understanding of academic and non-academic trajectories and points out several gaps and lines for future research. This and future studies should raise awareness of the different career options for PhD holders and promote changes in doctoral education and researcher development services to equip researchers to explore a diversity of career options and transition outside the academic sector if they so wish. Finally, studies in this field can contribute to strengthening the relationship between academic and non-academic sectors, establishing more effective ways of communicating and, more importantly, working together to solve societal challenges.

**Declarations**

**Conflict of Interest**

The authors declare that there exists no competing financial interest or personal relationships that could have appeared to influence the work reported in this paper.

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