

You have a PhD! What's next? The career paths of PhD holders

Authors: Anneleen Mortier¹, Katia Levecque¹, Noëmi Debacker²

¹ ECOOM–Ghent University, Department of Management, Work and Organizational Psychology

² ECOOM- Ghent University, Research Department

CAREER PATHS OF PHD HOLDERS

To date, we have little insight into the different career paths of PhD holders. With regards to academic careers in Flanders, we can turn to the *Human Resources in Research Flanders* (HRRF). Since 1990-1991, this particular database covers academic careers based on administrative data within all five Flemish universities. (see the ECOOM website: <https://www.ecoom.be/>). Getting a clear view of all the possible career opportunities is still a matter of conjecture.

However, in recent years there is a growing demand for clarity concerning these career paths, from the government, the non-academic labour market as well as universities, PhD holders and doctoral candidates. For the government, it is important to gain insight into the *return on investment* of PhD holders: to what extent can PhD holders apply their acquired knowledge and competences on the Flemish labour market, whether on the academic or non-academic labour market? The non-academic sector would like to see the added value of a PhD holder. Does a PhD even bring added value beyond the university's walls? Collecting data about the career opportunities of PhD holders helps universities to implement a better informed policy, which in turn helps to outline more targeted and outstanding programmes concerning the competence development of doctoral candidates and postdoctoral researchers (i.e. PhD holders conducting scientific research at a university). In addition, information on possible career paths assists PhD holders and PhD candidates to make a well-considered decision and allows them to shape their careers more according to their own wishes. To this day, only a small number of initiatives, mainly abroad, have been put in place to outline the career paths of PhD holders, such as the "10000 PhDs project" carried out by the university of Toronto (2017), Stanford PhD Holders Employment (2013) and the "Career of Doctorate Holders" carried out by OESO (2010).

In Flanders, we also observe a similar need to systematically map the career paths of PhD holders. In the recent Flemish government agreement, priority is given to acquire data of the career paths of PhD holders at Flemish universities. In order to meet this demand, ECOOM

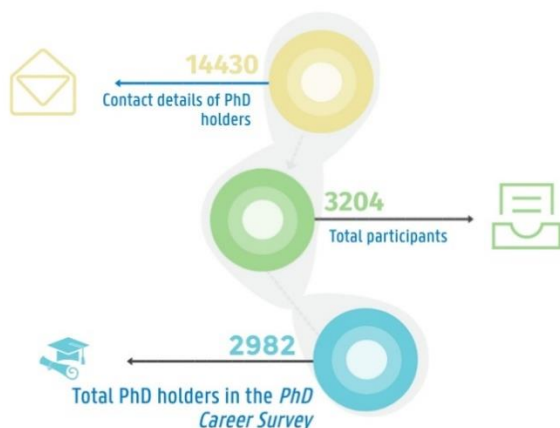
Ghent University carried out *The PhD Career Survey* in 2017. In this ECOOM-brief we discuss the methodology on which the survey is based. In the following ECOOM-briefs we will address the substantive findings.

DATA COLLECTION: FROM MONITORING PHD HOLDERS TO THE PHD CAREER SURVEY

ECOOM Ghent University's task, initiated by the Flemish government, is to monitor careers of researchers, including PhD holders. As previously mentioned, this is done by the HRRF with regards to academic careers. What the HRRF cannot offer however, is gaining insight into the career paths of PhD holders, who leave the Flemish universities. For this specifically, additional data collection is required. Hence ECOOM Ghent University set up a new monitoring project in which *The PhD Career Survey 2017* is the final chapter. In accordance with privacy legislation this was reported to the DPA, Data Protection Authority, with file number: VT005053577. The project consisted of two phases; namely tracking down the contact information of the PhD holders and an online questionnaire (sent in 2017). Figure 1 shows all the milestones of the monitoring process of PhD holders of which *The PhD Career Survey* is part.

Phase 1 took place between June 2016 and June 2017, during which we traced contact information of PhD holders. This was carried out using various social media platforms such as LinkedIn and Facebook, universities' and companies' websites and phone books. In Phase 1, we eventually found e-mail address for 14430 PhD holders. A number of patterns were determined. Pattern 1: based on the data obtained from the universities' websites, there was no gender difference in the presence of PhD holders on the social media platform "LinkedIn". Pattern 2: international PhD holders, particularly from Asian or African areas, were often difficult to track down. This is especially the case for PhD holders with a common (sur)name but also has to do with the practice of addressing foreign PhD holders with an unofficial name during their stay in Flanders.

Figure 1. Milestones in *The PhD Career Survey*



@Anneleen Mortier, ECOOM Ghent University. To consult figure: <https://my.visme.co/projects/31qk9ey4-phd-mijlpalen-eng>

Pattern 3: PhD holders with a little evolving or stagnant career in the same organisation often had no or (very) outdated LinkedIn profiles. Pattern 4: PHD holders with a liberal profession (e.g. physicians, lawyers ...) or working independently could often only be contacted indirectly or via their practice or organization (e.g. hospital) or via a helpdesk or general e-mail address. Pattern 5: PhD holders who moved abroad were more difficult to track down. Pattern 6: the contact details of PhD holders employed at a university were easily accessible. Figure 2 illustrates these six patterns in a nutshell.

Phase 2 was conducted between May 2017 and December 2017. In this phase, the survey was sent to all PhD holders whose contact details were found. *The PhD Career Survey* was developed specifically to map the different career paths of PhD holders, affiliated with a university and beyond. Permission was asked before taking part in the survey and if one did not want to participate, one could refuse. In the survey we inquired about crucial moments in the different stages of their careers, namely during the PhD track, the first job and the current job in case a PhD holder has had multiple jobs after their PhD.

The questions assessing the PhD track look at the extent of cooperation between other sectors (i.e. other universities, government, companies...) and what this cooperation consisted of. The questions concerning the first and current job gathered data about mobility, employment sector, degree of responsibility, type of contract, work schedule and job satisfaction aspects. The satisfactory aspects included: satisfaction concerning degree of autonomy, workload, "work-life balance", salary and job security. In addition, we asked questions about the perceived added value of a PhD degree when transitioning to the non-academic labour market and what the required level of education was for the current job. This allowed us to check whether there is over-qualification. Additionally, we examined whether PhD holders were still actively involved in research while executing their current job. In accordance with OECD-categorization, the distinction was made between basic, applied and experimental research. The survey also inquired about skills learned during the doctoral research and whether or not they were used in the current job.

The PhD Career Survey was sent via e-mail to all 14430 PhD holders whose contact details were found in Phase 2. 1417 e-mail addresses

were no longer in use. The contact details were then traced again for these PhD holders. In total, 729 working e-mail addresses were added to the list. In total, 3204 PhD holders started the survey, of which 2996 finished the questionnaire. Fourteen fully completed questionnaires could not be retained in the analysis due to not completing the PhD research or obtaining a PhD degree at a non-Flemish university. For 2982 PhD holders we have complete and useful data to map career paths.

Figure 2. The six different tracking patterns



@Anneleen Mortier, ECOOM Ghent University. To consult figure: <https://my.visme.co/projects/q6jnp1ee-patronen-bij-het-opsporen-eng>

WHO ARE THE PHD CAREER SURVEY PARTICIPANTS?

What demographic profile do the PhD holders who completed *The PhD Career Survey* have? When did they defend their doctoral dissertation and within what science field?

An overview of the key features of the participants can be found in Figure 3. Of all participants, 53.9% were male and the average age was 39.8 years old ($SD=7.28$). Of this, 59.7% was between 30 and 40 years old. The vast majority had a Belgian nationality (95.4%); only a minority came from outside Europe (1.7%). Of all participants 67.7% had children, 87% had a partner and the majority (84.4%) worked full-time. The year of doctoral defense ran from 1969 to 2017, 45.8% obtained their PhD between 2000 and 2009 and approximately half (49.7%) obtained it later than 2010. The distribution towards science cluster was as follows: 21.3% obtained a PhD in the exact sciences, 20.8% in the medical sciences, 25.4% in the applied sciences, 14.5% in humanities and 17.9% in social sciences. 0.6% of PhD holders had more than one PhD.

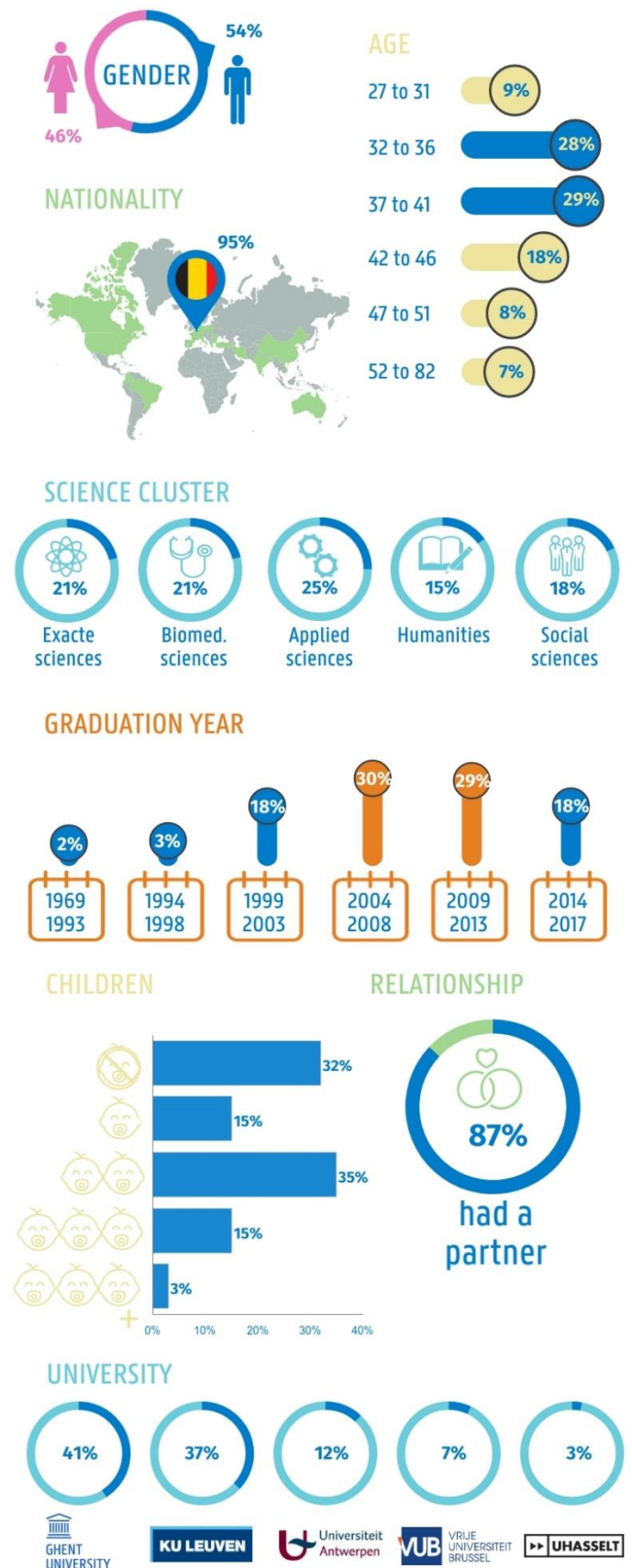
One important question that arises is that of participant representativeness: are the participants in the survey an accurate reflection of all PhD holders who obtained their doctorate in Flanders in the past? Are there specific profiles of PhD holders who participated in the survey? In other words: are there certain profiles of PhD holders who have systematically not, less or more participated in the survey and therefore could possibly distort our perception of the PhD holders' real career paths?

To answer the question of representativeness, there is a need for information about the total population's composition in relation to gender, age, nationality, science cluster, university of the obtained PhD and the graduation year. Nationality was divided into three groups:

Belgian, European Union with exceptions of Belgian nationality (EU28) and outside the EU (non-EU28). Such analysis of representativeness is not found in previous initiatives to map the career paths of PhD holders (see above). This is due to either no, or missing population data to compare survey data. Because of the HRRF, Flanders has population data and is therefore unique worldwide: basic information has been centralized from all PhD holders since 1990, across all disciplines and universities. There are no sources that allow us to determine representativeness of those who defended a doctorate before 1990. The representativeness analysis was carried out by examining how the group of participants in *The PhD Career Survey* differs from the total population of PhD holders registered in the HRRF according to gender, age, nationality, science cluster, alma mater and this for every graduation year in which the PhD was obtained.

The representativeness analysis shows us that, with a 99.9% reliability, we can say that the participants represented the entire population in terms of gender (with a slight over-representation of women who obtained their PhD in 2014). There was also a strong over-representation of Belgian PhD holders from 2000 onwards. Across all years there was an overrepresentation of social sciences and PhD holders who obtained their PhD at the Ghent University. In 2011 and 2016 there was also an over-representation of PhD holders from the Antwerp University and KU Leuven. KU Leuven is underrepresented in the graduation years 1990 to 2000 and in 2014. The VUB is underrepresented in the graduation year 2013.

Figure 3. Participants' characteristics of *The PhD Career Survey*



©Anneleen Mortier, ECOOM Ghent University. To consult figure: <https://my.visme.co/projects/z4j7rwry-copy-of-deelnemers-eng>

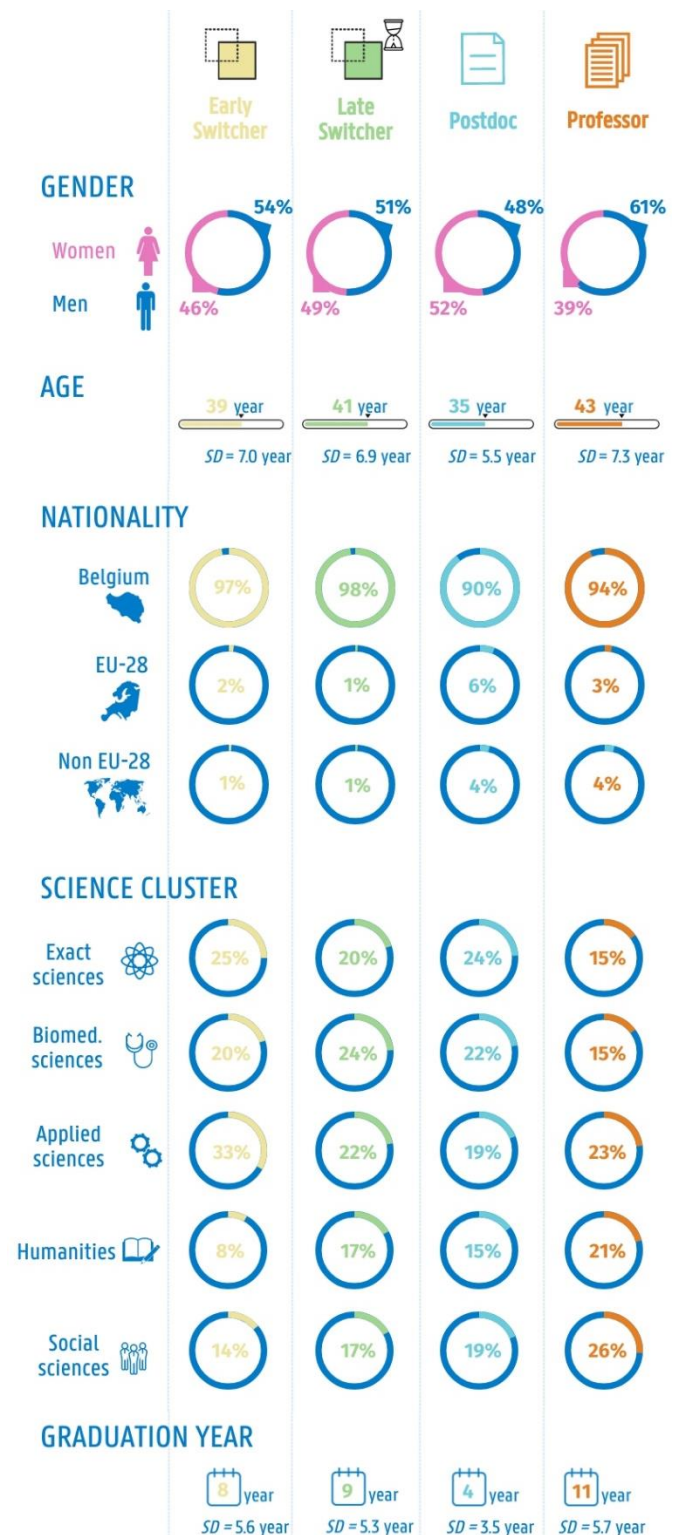
CAREER PATHS PERCEIVED FROM TWO DIFFERENT ANGLES

The *PhD Career Survey* takes a snapshot of the career path of the PhD holders. This implies that, at that time, there was information about the career progress of the participants. Based on the participants' answers there were several career paths to distinguish. This division was made based on job title and the number of job positions after the PhD, both at a (Flemish) university or beyond. If the participants had more than one job title and thus combined multiple functions (16% of the participants), we looked at the main occupation or position that took up the largest amount of working hours. The four different career paths we distinguished were the following: (1) the *“Early switchers”*: PhD holders with a current non-academic job title who have not had an academic post after completing their PhD (29%); (2) the *“Late switchers”*: PhD holders with a current non-academic job title and who have had an academic post after completing their PhD (29%); (3) *“Postdocs”*: PhD holders in a current postdoctoral position at a university (17%); (4) *“Professor”* (Tenured Academic Personnel): PhD holders who currently hold a position as professor at a university (24%).

The description of the statistical analysis to determine whether the participants in various career paths also vary considerably by gender, age, nationality, science cluster, alma mater and the graduation year is available in Appendix 1. Figure 4 shows the overview of each career path in some key numbers. For more detailed information, see Table 1 in Appendix 2.

An important note here is that PhD holders with the career path *“Postdoc”* were significantly younger and obtained their PhD more recently in comparison to PhD holders following the other three career paths. In other words, PhD holders following the *“Postdoc”* career path found themselves in an earlier stage in their career compared to PhD holders in one of the other three career paths. Therefore, there is a strong possibility that the vast majority of this group will evolve to *“Late Switcher”* or *“Professor”*. Based on HRRF data, we can conclude that out of the latest cohort researchers who obtained their doctorate in 2009-2012 19.47% are still employed five years later at a Flemish university as a postdoctoral researcher or Professor, of which 11.47% as a postdoctoral researcher.

Figure 4. Overview of the four career paths.



©Anneleen Mortier, ECOOM Ghent University. To consult figure: <https://my.visme.co/projects/pvg3mzng-beschrijving-van-de-vier-verschillende-carrierpaden-eng>

CONCLUSION

This brief presents the methodological description of *The PhD Career Survey*, its participants and how it came about. One of the survey's strengths is that the representativeness or selectivity of the sample can be checked based on the relevant population characteristics. For *The PhD Career Survey* this has been tested for gender, age, nationality, science cluster, alma mater and the graduation year in which the PhD was obtained.

A second strength is that the results are not limited to a specific science field or university. A third strength is that the survey also provides data on the PhD holders' perceptions on their job, making the data more extensive than mere administrative data. A fourth strength is that four career paths were set apart, each of which was sufficiently large and therefore making statistical comparisons between these paths possible. These career paths are not limited to academic careers but also include non-academic careers. As a result, *The PhD Career Survey* contains crucial information for doctoral candidates, PhD holders, the non-academic labour market, universities and governments. Further results on the career paths of PhD holders will be elaborated on in forthcoming ECOOM briefs and will be made available on the ECOOM website.

REFERENCES

HRRF, basic indicators junior researchers 2016-2017 (2019). ECOOM: https://www.ecoom.be/en/services/HRRF_basic_indicators_key_figures.

HRRF, basic indicators senior researchers 2016-2017 (2019). ECOOM: https://www.ecoom.be/en/services/HRRF_basic_indicators_key_figures.

Disclaimer: This ECOOM-brief reports findings of scientific research conducted by ECOOM Ghent University. Analyses and interpretations are the responsibility of the authors. They are not formal policy positions of the Flemish Government and Flemish authorities.

APPENDIX 1. OVERVIEW OF THE STATISTIC ANALYSIS

To check whether the participants in the various career paths also differed significantly with regards to gender, age, nationality, science cluster, alma mater and the graduation year in which the PhD was obtained, both the Chi-squared test and Cramer's V were used. Both tests determined whether the percentage of PhD holders in the four career paths significantly varied from each other with regards to relevant characteristics (significance level: $p < .05$). Cramer's V , however, is more compatible than the Chi-squared test because Cramer's V s are less subjective to the effect of the sample size on the test's significance level.

APPENDIX 2. OVERVIEW OF THE FOUR DIFFERENT CAREER PATHS

Table 1. Overview of the four career paths concerning participants of *The PhD Career Survey 2017*

	Early switcher	Late switcher	Postdoc	Professor
Gender				
Male	53.7%	51.1%	48.0%	61.5%
Female	46.3%	48.9%	52.0%	38.5%
Age				
27 - 31 years	10.1%	6.8%	22%	2.6%
32 - 36 years	31.0%	22.7%	49.7%	15.1%
37 - 41 years	28.7%	31.7%	18.6%	31.5%
42 - 46 years	18.1%	20.4%	5.6%	26.0%
47 - 51 years	6.0%	10.9%	2.1%	12.8%
52 - 82 years	6.3%	7.6%	2.1%	12.0%
Nationality				
Belgian	97.5%	97.8%	89.6%	93.6%
EU28	1.6%	1.2%	5.9%	2.9%
Non-EU28	0.8%	1.0%	4.5%	3.4%
Science cluster				
Exact sciences	24.8%	19.8%	24.4%	14.9%
Biomedical sciences	20.0%	24.3%	22.1%	14.8%
Applied sciences	33.1%	21.6%	19.8%	22.6%
Humanities	8.4%	17.0%	14.9%	21.4%
Social sciences	13.7%	17.3%	18.8%	26.3%
Graduation year				
1969 - 1993	1.4%	1.5%	0.5%	3.2%
1994 - 1998	1.4%	2.9%	0.0%	5.0%
1999 - 2003	14.6%	17.5%	1.7%	22.4%
2004 - 2008	23.5%	30.2%	9.2%	35.5%
2009 - 2013	34.3%	29.5%	33.7%	25.8%
2014 - 2017	24.8%	18.2%	54.9%	8.0%

We used Table 1 and Figure 4 to compare the four career paths with each other. For **gender** there was a significant difference over the four career paths ($\chi^2(3)=22.76$, $p<.001$; Cramer's $V=0.10$, $p<.001$). More specifically, more men were represented in the career path "Professor" (61.5%). **Age** was also significantly different over the four career paths ($\chi^2(30)=400.83$, $p<.001$; Cramer's $V=0.23$, $p<.001$). For example, the percentage of PhD holders in the age group 27 through 31 years was the largest in the career path "Postdoc" compared to the percentages of the other three career paths. In this age category, the percentage of PhD holders was the smallest in the career path "Professor" compared to the percentages of the other three career paths. Subsequently, the percentage of PhD holders, aged 32 through 36 years, differed considerably in each of the four career paths. The largest percentage was found with "Postdoc" (49.7%), followed by "Early switcher" (31.0%), "Late switcher" (22.7%) and "Professor" (15.1%). The percentage of PhD holders in the age category 37 through 41 years in "Postdoc" was significantly smaller than the percentages in the other three career paths. The percentage of PhD holders in the age group 42 through 46 years was significantly smaller than "Postdoc" compared to the percentages in the other three career paths. In this age group the percentage of "Professor" was also noticeably larger than the percentage of PhD holders in the career path "Early switchers". In the next age group, 47 through 51 years, the percentage of PhD holders in

the career path "*Postdoc*" was in turn significantly smaller compared to the percentages of the other three career paths. Here, the percentage of "*Professor*" was remarkably larger than the percentage of the other career paths. The percentage of PhD holders in the career path "*Late switchers*" was also noticeably larger than the percentage PhD holders in the career path "*Early switchers*". Lastly, the percentage of PhD holders in the age group 52 through 82 years in the career path "*Professor*" was significantly larger than the percentages of the other career paths. In addition, the percentage of PhD holders in the career path "*Postdoc*" was significantly smaller than the percentages in the other three career paths. There was no significant difference between the percentage of PhD holders "*Early switchers*" and the percentage of PhD holders "*Late switchers*".

Also for **nationality** there was a noteworthy difference between the four career paths ($\chi^2(6)=55.74$, $p<.001$; Cramer's $V=0.11$, $p<.001$). Here, the percentages of Belgians in the career paths "*Early switcher*" and "*Late switcher*" were significantly larger than the percentages of "*Postdoc*" and "*Professor*". For non-Belgians, but belonging to the EU28, the percentage of PhD holders in the career path "*Postdoc*" was significantly larger than the percentages "*Early switchers*" and "*Late switchers*". Finally, with regards to non-Belgians and non-Europeans (non-EU28), there was a significantly larger percentage PhD holders in the career path "*Postdoc*" and "*Professor*" in comparison with the percentages of "*Early switcher*" and "*Late switcher*".

Furthermore, the **science cluster** in which the PhD was obtained varied considerably over the four career paths ($\chi^2(12)=132.09$, $p<.001$; Cramer's $V=0.13$, $p<.001$). For the exact sciences, the percentage of PhD holders in the career path "*Professor*" was notably smaller than the percentage in the career path "*Postdoc*" and "*Early Switchers*". For the medical sciences, the percentage of PhD holders in the career path "*Professor*" was considerably smaller than the percentage in the career path "*Postdoc*" and "*Early Switchers*". For the humanities, the percentage of PhD holders in the career path "*Early Switchers*" was significantly smaller than the percentage PhD holders in all other career paths. Additionally, the percentage PhD holders in the career path "*Postdoc*" is notably smaller than the percentage in the "*Professor*"-career path. For the social science, the percentage PhD holders only varied in the career path "*Professor*", which was remarkably larger than all other career paths. Finally, for the applied sciences, only the percentage PhD holders in the career path "*Early Switcher*" was significantly larger compared with all other career paths.

The **graduation year** was also notably different over the four career paths ($\chi^2(24)=442.62$, $p<.001$; Cramer's $V=0.25$, $p<.001$). The percentage PhD holders in the career path "*Postdoc*" was remarkably smaller than the percentage PhD holders in the career path "*Professor*" graduated in the years 1969 to 1993. The percentage PhD holders in the career path "*Professor*" who graduated in 1994 to 1998 was also significantly larger in comparison with the percentages PhD holders in the career paths "*Postdoc*" and "*Early switchers*". Moreover, the percentage PhD holders in the career path "*Postdoc*" was notably smaller compared to the percentage PhD holders in the career path "*Late switchers*". In the years 1999 up to 2003 and 2004 up to 2008

there was a smaller percentage of PhD holders in the career path "*Postdoc*" in comparison with the percentages in all other career paths. The percentage PhD holders in the career path "*Professor*" was also significantly larger in relation to the percentage in the career path "*Early switchers*". In addition, for 2004 to 2008 there was a remarkably larger percentage with the career path "*Late switchers*" compared to the percentage in the career path "*Early switchers*". Subsequently, in the graduation years 2009 to 2013 the percentage PhD holders in the career path "*Professor*" was smaller than the percentage in all other three career paths. Finally, for the most recent graduation years 2014 to 2017 the percentages of all career paths varied significantly. The largest percentage can be allocated to PhD holders in the career path "*Postdoc*" (54.9%), next the career path "*Early switchers*" (24.8%), subsequently the career path "*Late switchers*" (18.2%) and conclusively the career path "*Professor*" (8.0%).