

2021 National Report on Junior Scholars



Statistical Data and Research Findings on Doctoral Students and Doctorate Holders in Germany

Overview of Key Results

BuWiN 2021 was prepared by an independent scientific consortium under the direction of the Institute for Innovation and Technology (iit) in the VDI/VDE-IT.

Dr. Stefan Krabel, Dr. Kalle Hauss, Dr. Alexandra Shajek, Mila Staneva (Ph.D.) and Sylvia Schmid represented the iit on the consortium.

The other members of the consortium were:

Bayerisches Staatsinstitut für Hochschulforschung und Hochschulplanung (IHf, Bavarian State Institute for Higher Education Research and Planning), represented by Volker Banschbach (until October 2019) and Dr. Maïke Reimer

Deutsches Zentrum für Hochschul- und Wissenschaftsforschung (DZHW, German Centre for Higher Education Research and Science Studies), represented by Dr. Kolja Briedis and Prof. Dr. Sandra Buchholz

Institut für Hochschulforschung at Martin Luther University Halle-Wittenberg (HoF, Institute for Higher Education Research), represented by Dr. Anke Burkhardt

International Centre for Higher Education Research Kassel (INCHER-Kassel), represented by Prof. Dr. Guido Bünstorf and Prof. Dr. Georg Krücken

Federal Statistical Office (Destatis), represented by Pia Brugger, Dr. Meike Vollmar and Stefan Brings

Other bodies involved in BuWiN 2021

A scientific advisory board, chaired by **Professor Karl Ulrich Mayer Ph.D.**, guided the consortium.

The other members of the advisory board were:

- Prof. Dr. Silke Anger (*University of Bamberg and the Institute for Employment Research*)
- Prof. Dr. Jetta Frost (*Universität Hamburg*)
- Prof. Dr. Barbara Kehm (*Leibniz Center for Science and Society*)
- Prof. Dr. Erika Kothe (*Friedrich Schiller University of Jena*)
- Prof. Dr. Kai Maaz (*DIPF/Leibniz Institute for Research and Information in Education*)
- Prof. Dr. Claudia Peus (*Technical University of Munich*)
- Prof. Dr. Beatrice Rammstedt (*GESIS – Leibniz Institute for the Social Sciences*)
- Prof. Dr. Jürgen Schupp (*German Institute for Economic Research, Berlin*)
- Prof. Dr. Ernst-Ludwig von Thadden (*University of Mannheim*)

Moreover, the consortium coordinated the collaboration with a steering committee, composed of representatives from the following institutions:

- Federal Ministry of Education and Research (*BMBF*)
- German Research Foundation (*DFG*)
- The ministries of higher education and science of the federal states, represented by the Brandenburg Ministry of Science, Research and Culture (*MWFK*)
- German Rectors' Conference (*HRK*)
- Standing Conference of the Ministers of Education and Cultural Affairs (*KMK*)
- German Council of Science and Humanities (*WR*)

Supporting studies for BuWiN 2021

BuWiN 2021 was based on supporting studies. The following played a part in conducting these supporting studies:

Prof. Dr. Guido Bünstorf, Dr. Johannes König (*International Centre for Higher Education Research, INCHER-Kassel*)

Dr. Anne Otto (*Regional Research Network, IAB Rhineland-Palatinate-Saarland*)

Dr. Kolja Briedis, Fine Cordua, Hendrik Schirmer (*German Centre for Higher Education Research and Science Studies, DZHW*)

Dr. Maïke Reimer, Dr. Johanna Witte, Dr. Thorsten Lenz, Volker Banschbach (*Bavarian State Institute for Higher Education Research and Planning, IHf*)

Dr. Anke Burkhardt, Aaron Philipp, Philipp Rediger, Jens-Heinrich Schäfer (*Institute for Higher Education Research Halle-Wittenberg, HoF*)

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Overview of Key Results

Introduction

During their doctoral and post-doctoral studies, early career researchers make decisive contributions to scientific and societal development and innovations. At the same time, training the next generation of academics is crucial for satisfying the future demand for highly skilled personnel. It is thus especially important to report on the situation of early career researchers.

The purpose of the National Report on Early Career Researchers (Bundesbericht Wissenschaftlicher Nachwuchs – BuWiN) is to process and analyse current findings and data relating to young academics in Germany and to make such data available for research. This produces a body of basic empirical knowledge for the academic community, as well as serving as a guideline for the federal and state governments, scientific institutions and funding organisations. Furthermore, the report serves as a point of reference for young academics themselves.

BuWiN 2021 presents statistical data and current research findings on the number of early career researchers, on their working and employment conditions, qualification requirements during their doctoral studies, transitions to further training and on the career paths and prospects of young academics on completing their doctorate. Moreover, it focuses on the staff structure and personnel development at both higher education institutions (HEIs) and non-university research institutes, and examines the work-life balance with regard to academic careers. It also sheds light on the international mobility of academic staff and offers an analysis of the individual disciplines in selected subjects.

Previous National Reports on early career researchers had a different focus. The 2008 report presented an international comparison of professional qualifications, the 2013 report took a closer look at career prospects and the career paths pursued by early career researchers after completing their doctoral studies, while the key topic in 2017 was the compatibility of family life and an academic career.

The special focus chapter of BuWiN 2021 is entitled “Career paths pursued by doctorate holders”. It analyses

the career trajectories of early career scientists in the first few years after earning their doctorate, traces their transitions into the economy and the public sector and identifies critical transition points. Moreover, it reviews the value of getting a doctorate; for example, by comparing the salaries of doctorate holders and non-doctorate graduates. This analysis sheds light on the career prospects of doctorate holders and makes it possible to evaluate the significance of academic training at the doctoral level for the labour market. It expands the focus of BuWiN 2013 and is highly relevant, particularly in light of digitalisation and the growing importance of knowledge-intensive goods and services.

BuWiN 2021 as a national report focuses on national-level developments for 2021. As in previous reports, the perspective of individual HEIs, non-university research facilities and the specific situation in each of Germany’s federal states can only be considered on a case-by-case basis. The data on the HEIs is presented in summarised form. When feasible and helpful, the findings are also shown separately by subject group, training and career phase, and by gender.

In contrast to the previous reports, BuWiN 2021 takes a closer look at staff structure and personnel development. Now that tenure track professorships have been established at universities throughout Germany and staff development initiatives have been extended at both HEIs and non-university research facilities, changes in staffing structures, along with improved and adapted personnel development measures, are becoming apparent at both kinds of institutions and are likely to continue in the years ahead. BuWiN 2021 is turning the spotlight strongly on these developments. Moreover, the individual disciplines in selected subjects are presented in greater detail than in previous national reports and the special focus chapter introduces the results of a new empirical approach analysing career paths. In the past, BuWiN presented the career trajectories of doctorate holders based on evaluations of survey data. This BuWiN studies the career paths based on Integrated Employment Biographies¹.

¹ https://fdz.iab.de/en/FDZ_Individual_Data/Integrated_Employment_Biographies.aspx; last checked on 20.01.2021.

A Conditions for the qualification of early career researchers and methodological explanations

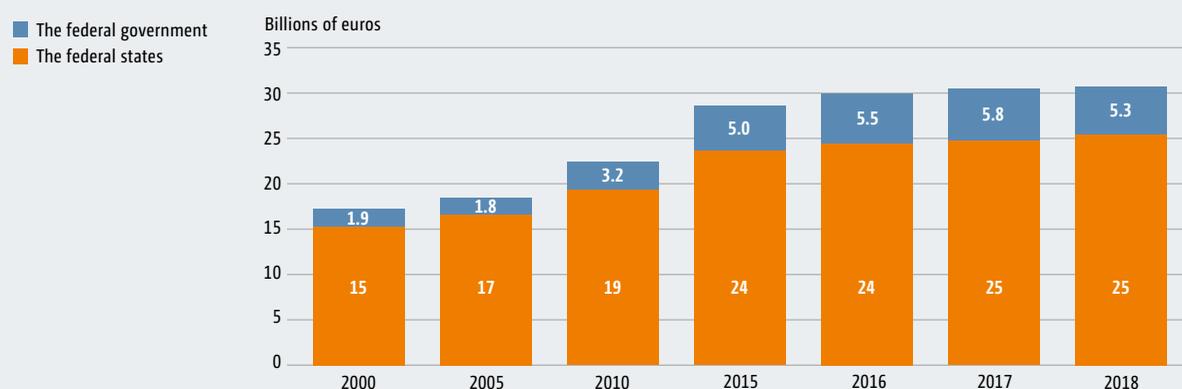
A1 Expenditure on research and development

- **More expenditure on research and development:** In Germany, the state and industry combined spent some 104.7 billion euros on research and development in 2018. As in other OED countries, this percentage increased between 2005 and 2018. In 2018, this expenditure accounted for 3.1% of the gross domestic product (GDP). Germany therefore ranks above average for OECD countries.
- **Higher education institutions and non-university research facilities are the main providers of training and support for early career researchers in Germany:** Most research activities are carried out by early career researchers at HEIs and non-university research facilities. They are thus the main providers of training and support for early career researchers in Germany. At the same time, doctoral candidates are increasingly co-operating with non-university institutions or universities of applied sciences to earn their doctorates.

A2 Training and support for early career scientists in Germany

The federal government and the federal states support ongoing staffing structure development and the academic training of early career researchers at HEIs and non-university research facilities by offering reform initiatives and programmes. Part of these are the following initiatives:

- **The financial situation for training young scholars is stable:** General university funds for state universities come almost exclusively from the budgets of the federal states. These funds are the most important foundation for the promotion and training of early career researchers. They increased from 15 billion euros to 25 billion euros between 2000 and 2018 (Fig. 1). The initiatives and programmes offered by the German Research Foundation (DFG), the federal government, the private sector, the EU, and various foundations all complement the measures aimed at promoting young academics. Furthermore, third-party funding, current basic funding, and institutional funding all rose substantially between 2005 and 2018.
- **The Tenure Track Programme of the federal government and the federal states:** The aim of the Tenure Track Programme is to improve the planning and increase the transparency of academic careers for young researchers at universities and equivalent HEIs, and to establish tenure track professorships throughout Germany as a separate career path and as a transition to a tenured professorship. Throughout the duration of the programme (2017 to 2032), the federal government is providing 1 billion euros for 1,000 additional tenure track professorships nationwide.
- **Clusters of Excellence and Universities of Excellence:** The two funding mechanisms of the successor to the Initiative for Excellence are opening up new training and development opportunities for the next generation of academics. When selecting the best proposals, both funding mechanisms, for which the federal government and the federal states earmarked a total of 533 million euros per year from 2019, also considered the prospects for promoting early career researchers.

Fig. 1: Public expenditure on on HEIs by governmental body over time (2000 to 2018, in billions of euros)¹

¹ The slight decline in federal government expenditure between 2017 and 2018 is due to the decreasing amount of funding in the final programme phase of the Higher Education Pact 2020; see Federal Statistical Office (2019): Report on Educational Finance 2019, Wiesbaden, p. 56.
Source: Federal Statistical Office (diverse): Report on Educational Finance, Wiesbaden; own representation

- **Pact for Research and Innovation (PRI I IV):** The fourth funding phase of the Pact for Research and Innovation (PFI IV) adopted in 2019 will run from 2021 to 2030 with a total funding volume of an additional €17 billion. As a rule, initiatives that are specifically intended for young academics are defined with the goal of attracting – and retaining – the best and the brightest. In this regard, there is a general obligation to offer early career researchers career paths both inside and outside the world of academia.

A3 Current key topics relating to the training of early career researchers

- **Careers and employment conditions:** The most pressing question in the debate on benchmarking the employment conditions in the academic system is how the conditions of employment can be structured appropriately and to what extent the number of non-professorial staff at universities can or, more to the point, should be increased. German Law on Fixed-Term Employment Contracts in the Science and Research Sector (Wissenschaftszeitvertragsgesetz, WissZeitVG) stipulates temporary employment contracts for academic staff at HEIs and non-university research facilities.
- **International developments:** The academic systems in China and other Asian countries such as India and Malaysia are experiencing dynamic growth. The impact that these shifts – and the surge in nationalism in some countries – will have on the science system, and thus on the research conditions for young academics, is currently the subject of public debate and science policy discourse.
- **Ensuring the high quality of academic qualifications:** At regular intervals, discussions focus on quality control with regard to the training of young academics. Moreover, public debate frequently seizes upon any accusations of plagiarism in dissertations submitted by public figures, while the scientific community considers whether universities of applied sciences should have the right to award doctorates and discusses the regulatory requirements of industrial doctorates.

- **Equal opportunities and the compatibility of family life and an academic career:** Young scholars often plan their academic careers and transitions into the post-doc phase at an age when family planning is also a priority. Apart from the work-life balance with regard to academic careers, the topics of gender equality, opportunities for admission to doctoral studies and the ability to plan careers in science are central to the struggle for greater equal opportunities in academia.
- **The digitalisation of research and teaching:** Concepts such as MOOCs, blended learning and Open Science reflect the progressive digital transformation of research and teaching. However, new technologies are also transforming the production, communication and dissemination of scientific findings.
- **The COVID-19 pandemic:** More than almost any other event, the COVID-19 pandemic has dominated the science landscape and academic discourse. Numerous research funding organisations and the federal government have responded by introducing legislative changes and by temporarily adjusting their funding conditions to minimise the impact of the COVID-19 pandemic.

A4 Terminology and concepts

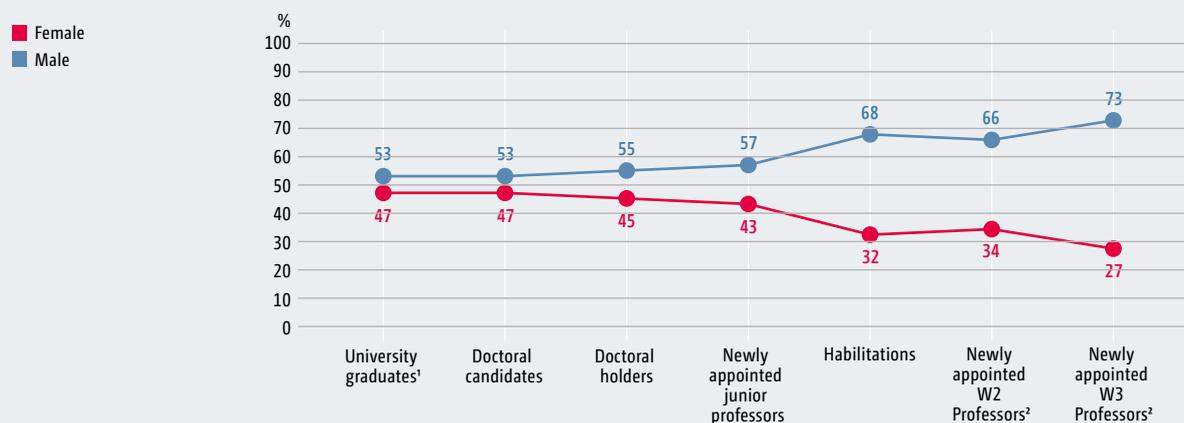
- **Inconsistent use of the term “early career scientists”:** There is no standard definition of the term “early career scientists” in research. Empirical studies often use the term to give prominence to certain subgroups (e.g. doctoral candidates). As a result, the focus is rarely on representing and defining the entire group of early career scientists in statistical terms.
- **BuWiN proposes a general definition of the term “early career researchers”:** The report proposes a definition that divides young academics into three groups. (1) The potential capacity of early career researchers is defined on the basis of formal qualifications. Graduates holding a university degree entitling them to undertake doctoral studies constitute the potential of early career researchers during the doctoral phase (R1), while doctorate holders constitute the potential of early career researchers in the post-doc phase (R2) or in the probationary phase (R3). (2) By extension, early career researchers can be regarded as a subset of the potential. The constitutive factor is that they are engaged in scientific work in research and development or in academic teaching. (3) They are distinguished from early career researchers in the narrower sense by their place of employment. This group includes early career academics employed at both HEIs and non-university research facilities.
- **Selecting the data sources in BuWiN:** In BuWiN, the data comes mainly from official statistics. Official statistics undergo regular validity checks, are continuously updated and, owing to their wide thematic scope, provide a variety of key indicators to monitor early career researchers. Where certain issues could not be addressed based on data from official statistics, this report draws on the results of regular surveys, which allow further analysis. Furthermore, in cases where neither official data nor regular surveys were available on important topics, individual studies and other data sources were consulted.

B The results of monitoring early career researchers

B1 Basic information relating to early career researchers

- The number of early career researchers has increased significantly since 2005:** The headcount of arts and science staff under 35 working in HEIs (excluding professors) shot up by 78% between 2005 and 2018, while that of arts and science staff between 35 and 45 years of age (excluding professors) almost doubled, with an increase of 43%. At non-university research facilities, the number of academics under 35 without a doctorate rose by 8% and the number of doctorate holders under 45 rose by 20% between 2014 and 2018.
- Declining proportion of women working at higher qualification levels in the academic field:** There is a notable decline in the proportion of women ascending the training and career ladder (leaky pipeline). At the same time, the female headcount in all groups has gradually increased over time (Fig. 2).
- Tenure track professorships are being established throughout Germany:** The Tenure Track Programme is aimed at early career academics. Since the amendment of the German Higher Education Statistics Act (Hochschulstatistikgesetz) in 2016, tenure track professorships have been included in university staff statistics. In the 2018 reporting year, 519 tenure track professors were employed at German universities and equivalent HEIs (W1 and W2 appointments, professors with fixed-term contracts and tenure track).

Fig. 2: The proportion of women in various groups of early career researchers and potential for early career researchers in 2018 by subject group (in %)



¹ University degrees (excluding teacher training): Master's degree, diploma (University), diploma (University of Applied Science), "Lizentiat", "Staatsexamen"
² At universities, theological and teacher training colleges. Here excluding academies of art and conservatories.

Sources: for university degrees: Federal Statistical Office (2020): Studies at institutions of higher education – special evaluation, Wiesbaden; for doctoral candidates: Federal Statistical Office (2019): Doctoral candidate statistics: analysis on the completeness and quality of the second survey 2018, Wiesbaden; for doctorate holders: Federal Statistical Office (2019) Studies at institutions of higher education – Fachserie 11, Reihe 4.2, Wiesbaden; for habilitations: Federal Statistical Office (2019): Staff at institutions of higher education – Fachserie 11, Reihe 4.4, Wiesbaden; for junior professors, W2 and W3 professors; Federal Statistical Office (2020): Staff at institutions of higher education, special evaluation, Wiesbaden; own representation

Tab: 1: The number of early career researchers and their potential (in persons) in 2018

Group of early career researchers/potential	Under 35	35 to 45 years of age	No age limit	Data source/explanatory notes
University graduates	1,496,000	–	–	Table B1, reference year 2019
Doctoral candidates	–	–	173,779	Figure B4
Doctorate holders	282,000		–	Table B3, reference year 2019
Arts and science staff (excluding professors) working in HEIs (main occupation)	116,380	51,397	–	Table B8
Academics at non-university research facilities and other private-sector scientific institutions	24,126 ²	16,467 ³	–	Table B12
Academics in industry	–	–	280,095	Table B13, reference year 2017
Habilitations	–	–	5,082	Federal Statistical Office (2019): Staff at institutions of higher education – Fachserie 11, Reihe 4.4, Wiesbaden
Junior research group leaders (at HEIs)	–	–	1,242	Figure B21
Junior research group leaders (at the four major non-university research facilities)	–	–	581	Table B6
Emmy Noether junior research groups	–	–	353	Table B6
Junior professors	–	–	1,580	Figure B15
Tenure track professors	–	–	519	Figure B19

¹ University degrees entitling the holder to undertake doctoral studies.

² Without doctorates.

³ Doctorate holders under 45.

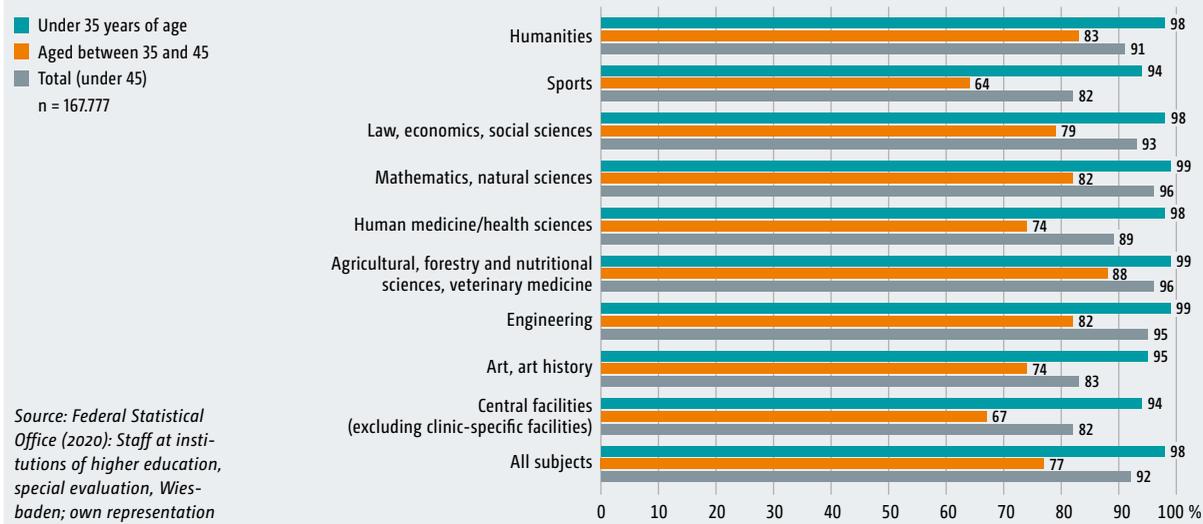
Sources: see references to figures and tables; own representation

- **Habilitations, junior research group leaderships and junior professorships:** Habilitation (a formal post-doctoral award making the holder eligible for a professorship) is still important in all subject groups, with some 1,529 habilitations being completed in 2018. Most habilitations were completed in the human medicine/health sciences subject group. To date, junior and tenure track professorships have been relatively common in law, economics and the social sciences. Overall, there were 1,580 junior professors in 2018 (Tab. 1). Of the 1,242 junior research group leaders at HEIs, 39%, or the largest share, can be found in mathematics and the natural sciences.

B2 The working and employment conditions of early career researchers

- **Approximately nine out of ten young academics are employed on a temporary basis:** 92% of the arts and science staff working in HEIs as their main occupation (under 45 years of age, excluding professors) are on fixed-term contracts (Fig. 3). The rate of fixed-term contracts for employees under 35 is higher (98%) than for those aged between 35 and 45 (77%). The proportion of temporary academic staff at non-university research facilities is slightly lower than that at HEIs: the share of fixed-term contracts for personnel under 35 years without a doctorate is 90%, with 72% among doctorate holders under 45.
- **The average contract term is approximately two years:** Doctoral students have an average term of around 22 months, based on their current employment contract, while the average term for post-docs is roughly 28 months.

Fig. 3: The proportion of arts and science staff (under 45, excluding professors) on fixed-term contracts as their main occupation in HEIs in 2018, by subject group and age (in %)

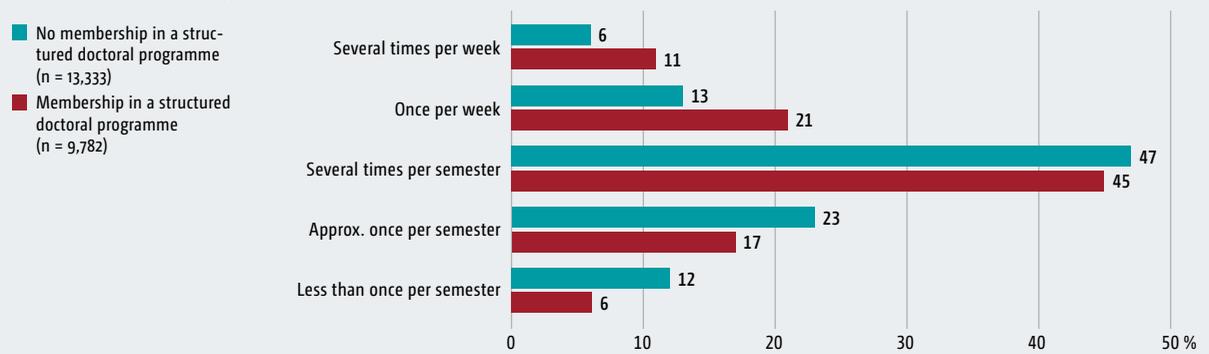


- **More than a third of young academics are employed on a part-time basis:** 37% of the arts and science staff working in HEIs as their main occupation (under 45 years of age, excluding professors) are on part-time contracts. This figure is 40% for persons under 35 years and 28% for those aged between 35 and 45.
- **Most doctoral candidates are employed by an HEI or a research facility:** Most doctoral candidates earn their living from their employment at an HE institution or research facility. This is the main source of funding for 57% of doctoral candidates.

B3 The qualification conditions and framework conditions for doctoral candidates

- **The right to award doctorates is no longer the exclusive province of the universities and equivalent HEIs:** Although the universities are traditionally responsible for overseeing the doctoral process, the question of also allowing universities of applied sciences to award doctorates is gaining greater momentum. Recent legislative changes have resulted in highly research-oriented faculties at some universities of applied sciences being granted the right to award doctorates.
- **Formalised arrangements for supervising doctoral candidates:** Three quarters of all doctoral students have signed a supervision or doctoral agreement. This percentage is higher for members of structured doctoral programmes than for non-members (83% vs. 69%). More than three quarters of doctoral candidates in structured doctoral programmes and two thirds of traditional doctoral candidates meet with their main supervisor at least several times each semester. This form of exchange is relatively common in mathematics and the natural sciences and comparatively rare in the subject group of art and art history.
- **The average time to doctorate is just under six years:** The average length of doctoral studies is 5.7 years (excluding human medicine/health sciences). The average time to doctorate for all subjects is 4.7 years, which breaks down to 4.9 years for men and 4.3 years for women.

Fig. 4: Frequency of doctoral candidates' meetings with their main supervisor in 2019, by membership in structured doctoral programmes¹



¹ Only doctoral candidates to whom the relevant attributes applied were included.

Source: German Centre for Higher Education Research and Science Studies (DZHW, 2020): data portal of the National Academics Panel Study (Nacaps); <https://nacaps-datenportal.de/> (in German only); last checked on 29.09.2020

B4 The transition to doctoral studies and to a professorial appointment

- **The rate of doctorates awarded differs according to the subject:** The rate of doctorates awarded varies according to the subject, from 4% in art and art history to 57% in human medicine/health sciences. At 38%, mathematics and the natural sciences achieve the second highest rate of doctorates. Over time, the rates in the subject groups analysed only fluctuate slightly.
- **Gender and parenthood affect doctoral enrolments:** Survey results show that women are less likely to embark on doctoral studies than men, while individuals with children are less likely to begin a doctorate than those without.

Tab. 2: The proportion of professors entering age-related retirement between 2019 and 2028 by subject group (number of individuals and in %)

Subject groups	Professors in long-term employment in universities ¹ and art schools in 2018	Professors retiring in the period 2019–2028	Share of the total number of professors in 2018 retiring in the period 2019–2028
	Number of individuals		in %
Humanities	4,329	1,581	37
Sports	250	88	35
Law, economics, social sciences	6,125	1,536	25
Mathematics, natural sciences	5,637	1,838	33
Human medicine/health sciences ²	3,634	1,293	36
Agricultural, forestry and nutritional sciences, veterinary medicine	636	255	40
Engineering	3,677	1,309	36
Art, art history	2,858	1,083	38
Central facilities (excluding clinic-specific facilities)	411	102	25
Total	27,557	9,085	33

¹ Including teacher training and theological colleges.

² Including central facilities at university clinics (human medicine only).

Source: Federal Statistical Office (2019): Staff at institutions of higher education 2018 – Fachserie 11, Reihe 4.4, Table 9 and Table 15, Wiesbaden; own representation

- **The proportion of women submitting applications, achieving shortlist places and professorial appointments has increased substantially over time:** In 2018, 29% of applications, 33% of the shortlist places and 34% of appointments to a professorship at universities and equivalent HEIs were women. The corresponding figures for 1997 were 13% (applications), 15% (shortlist places) and 17% (appointments).
- **The proportion of age-related professorial retirements is increasing:** The number of professors entering retirement for age-related reasons in the period 2019 to 2028 (reference year 2018) is 33% (Tab. 2).

B5 Staffing structure and personnel development

- **Job profiles are being newly created and revised for the transition to professorial appointments at both HEIs and at non-university research facilities:** Tenure track professorships are being established at universities throughout Germany, while non-university research facilities are reinforcing and advancing academic careers via junior research group leaderships in order to prepare candidates for a management position in academia.
- **Personnel development is becoming more relevant at HEIs and non-university research facilities:** Numerous personnel development measures have been introduced with a view to improving employment conditions in the post-doc and probationary phases (see Tab. 3 for fields of action and personnel development measures).

Tab. 3: Fields of action and personnel development measures

Field of action	Examples of measures
Personnel planning and staff recruitment	Staff selection, active recruitment of women, dual career
Staff deployment and development	Welcome programmes and support/onboarding for new employees, briefings and consultations for newly appointed professors, (team) coaching/supervision, mentoring, executive development, development of management skills, career development, succession planning, team development, internal training and professional development, structured performance reviews
Staff retention and commitment	Conflict resolution/mediation, operational health management/health promotion, family services, tenure track programme, needs-based increase in long-term employment contracts
Staff reduction	Management of temporary or permanent leavers and the generational turnover

Source: own representation, based on UniNetzPE (2015): *Kodex für gute Personalentwicklung an Universitäten*; <https://uninetzpe.de/personalentwicklung/kodex/> (in German only); last checked on 01.10.2020

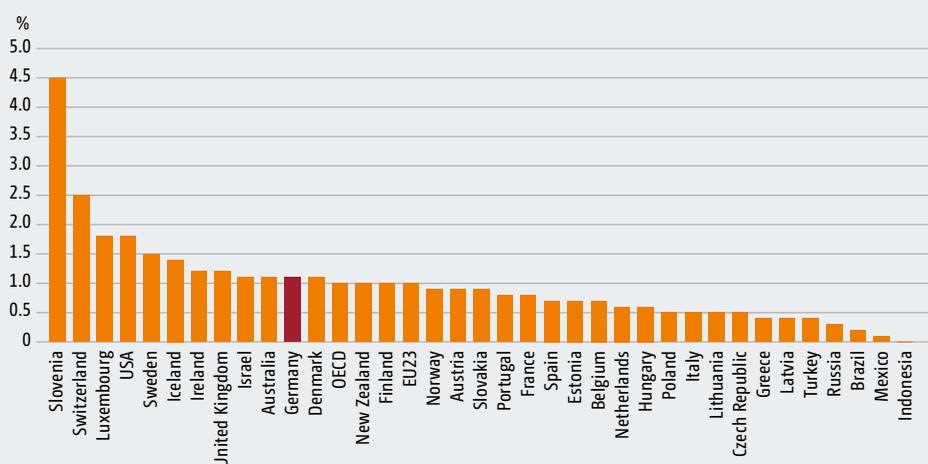
B6 The compatibility of family life and an academic career

- **Early career researchers with children:** Current surveys show that approximately one sixth of doctoral candidates and roughly half of the academic staff with doctorates at HEIs are parents. With regard to starting a family, early career academics continue to lag behind their university graduate peers not employed in academia.
- **Minor gender differences between parents:** Men are slightly more likely than women to have children in both the doctoral and the post-doc phase. Moreover, men have a much greater tendency than women to start a family after being appointed professor.
- **Most early career researchers want children:** Although, as reported in BuWiN 2017, early career researchers are eager to have children, it may be assumed that a large majority, especially young female academics, will remain childless. As a result, the young female scholars surveyed in 2019 also cited uncertain career prospects, the lack of compatibility and limited financial security as the main reasons for postponing their desire to have children, at least while studying for a doctorate.
- **A wide range of specific measures to improve the compatibility of family life and an academic career for early career researchers:** The WissZeitVG has included a family policy component since 2016. Furthermore, legal provisions are in place for academic staff who are excluded from the scope of the WissZeitVG in the federal states. The higher education and civil service legislation of the federal states in particular include considerations on the compatibility of family life and an academic career. PRI IV addresses this compatibility as an integral part of staff development. The Tenure Track Programme contains various regulations to improve the work-life balance, while the funding programmes of the German Research Foundation also have a package of measures to boost the compatibility of family life and an academic career.

B7 Internationality in academia and the international mobility of young scholars

- **The share of non-German academic staff (based on nationality) at HEIs and non-university research facilities has increased over time:** The proportion of international academic staff at universities (in individuals) rose from 10% in 2010 to 12% in 2018. The share of international academic staff (in full-time equivalents) at non-university research facilities almost doubled over the same period, from 15% to 27%.
- **Most young academics first earn their doctorate before spending at least three months abroad:** Approximately one third of doctorate holders from Germany have spent more than three months abroad for research purposes in the last ten years. The corresponding figure for graduates without a doctorate is roughly one in ten. This shows that most academics from Germany wait until after their doctoral studies to spend longer periods abroad; such visits are relatively seldom during the doctoral phase.
- **By international standards, a doctorate is considered relatively important in Germany:** 1.1% of the German population aged between 25 and 64 hold a doctorate (Fig. 5). In an international comparison of the OECD countries in reference year 2019, Germany ranks in joint ninth place, along with Denmark, Israel and Australia. Small countries, such as Slovenia (4.5%), Switzerland (2.5%) and Luxembourg, (1.8%) are at the top of the league.

Fig. 5: The proportion of doctorate holders in the general population between the ages of 25 and 64, by international comparison (in %)



Source: OECD (2020),
Education at a glance 2020,
Paris

B8 Individual disciplines and academic careers

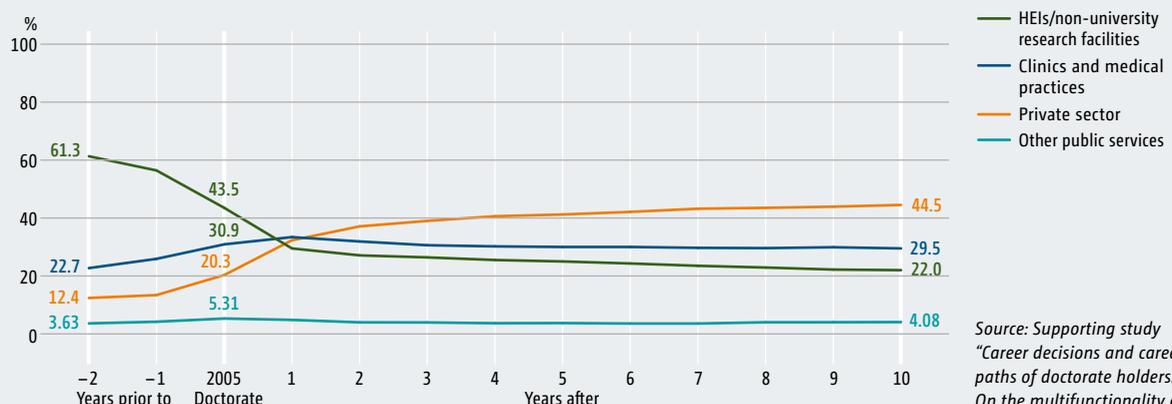
- **History:** The monograph continues to be extremely important in history. A monograph that has received top marks and that has since been published by a well-known and reputable publisher is considered a prerequisite for a successful academic career. For the most part, research is carried out as an individual endeavour and not as part of a research consortium. At 33.4 years, the average or median age of completing doctoral studies is relatively high compared to other degrees.
- **Economics:** Publishing papers in national and international journals is extremely important in economics. As a rule, dissertations are written as monographs or as a series of several specialist articles. Compared to other subjects, it is worth noting that a particularly large percentage, namely 30%, of dissertations receive the highest accolade (summa cum laude). The median age at which a habilitation is awarded, 37 years, is relatively young. Furthermore, experts regard the permeability of the non-academic labour market as high.
- **Biology:** Approximately two thirds of university graduates in biology go on to complete a doctorate, meaning that the rate of biology doctorates is extremely high. Research is often conducted in large consortia with a strong international focus.
- **Electrical engineering and computer science:** In most cases, research is carried out in large, multi-site project groups and international research consortia. Attracting third-party funding is essential, along with publishing in international journals. Experts estimate that graduates have unrestricted access to the non-academic labour market at every career level.

C Career paths pursued by doctorate holders

C3 Career paths pursued by doctorate holders over time

- New methodological approach:** The Integrated Employment Biographies published by the Institute for Employment Research, which consist of social security notifications submitted by employers and process data provided by the German Federal Employment Agency, serve as an important database for the focus chapter. They contain detailed information on the employment history of all those who pay mandatory social security contributions or are in marginal employment, recipients of benefits, job seekers, unemployed workers and those participating in social support programmes. The Integrated Employment Biographies are merged at the individual level with data on doctorate holders and doctorates compiled by the German National Library, to analyse the career paths pursued by doctorate holders, such as the development of their employment status and the employment sector.
- Doctorate holders in full employment:** The unemployment rate of doctorate holders barely fluctuates at less than 2%. This means that doctorate holders are almost fully employed. Moreover, the findings show that, one year after completing their doctorate, around four fifths of doctorate holders are in full-time positions. The results indicate that doctorate holders have excellent employment prospects on the labour market.
- Most doctorate holders leave the HEI or non-university research facility in the post-doc phase:** Two years before earning their doctorate, 61% of doctorate holders work at HEIs or non-university research facilities. However, this percentage declines significantly in the years following their doctorate. The drop is particularly notable in the first twelve months of the post-doc phase. During this period, the rate of employment in the academic sector falls from 44% to 30%. Ten years after their doctorate, roughly one in five doctorate holders (22%) still work at HEIs or non-university research facilities (Fig. 6).

Fig. 6: The employment sector of doctorate holders as of 30 June each year, 2005 cohort (in %)

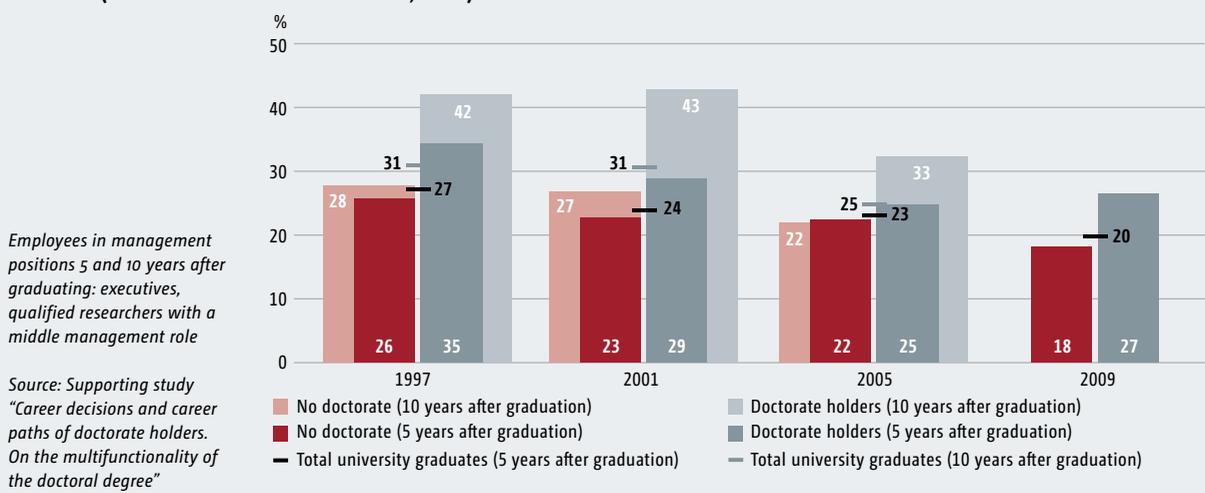


Source: Supporting study "Career decisions and career paths of doctorate holders. On the multifunctionality of the doctoral degree"

C4 Doctoral earnings

- **Doctorate holders have a higher income than graduates without a doctorate:** A comparison between the income of graduates with and without a doctorate five years after achieving the first level of professional qualification shows that doctorate holders have a higher income. When viewed across several survey cohorts, the difference in gross pay for full-time work five years after graduating is in the region of 10,000 euros.
- **Doctorate holders are more likely to occupy management positions than those without a doctorate:** Ten years after achieving the first level of professional qualification, approximately one third to just under half of all doctorate holders holds a management position, while the figure is around one in five to one in four for graduates without a doctorate (Fig. 7). Men are more likely than women to hold management positions (this applies to both groups of graduates, namely those with and without doctorates).
- **In most cases, doctorate holders are adequately employed:** Fully adequate employment is when an individual’s personal expertise coincides with the skills required in the position and when their level of formal education corresponds to the educational requirements. Evaluations of the graduate panel on various cohorts show that around four in five doctorate holders and approximately two thirds of graduates without a doctorate are in fully adequate employment. These findings indicate that academic qualifications and the expertise acquired thereby are essential in preparing the majority of doctorate holders to carry out their tasks.

Fig. 7: The proportion of employees in management positions by qualification level (with and without a doctorate, in %)



D Outlook

D1 Current developments in the situation of early career researchers

- **The COVID-19 pandemic is disrupting research and teaching:** The pandemic has led to a great many restrictions in conducting research. For example, laboratories, libraries and other resources at HEIs and non-university research facilities have been forced to close due to the pandemic. Some disciplines, in which social distancing and hygiene concepts are difficult to implement, are experiencing particularly difficult conditions.
- **Amendments to WissZeitVG owing to the COVID-19 pandemic:** To ensure that qualifications can be completed, one response on the part of the federal government was to extend the WissZeitVG temporarily and to adjust the maximum fixed term of contracts. Funding organisations have also responded to the restrictions resulting from the pandemic by amending their funding instruments, particularly regarding their lifespan.
- **Discussions focus on scepticism towards science, yet trust in science is on the rise:** Science's claim to truth is increasingly being challenged in the public arena. In some countries, academics are even exposed to violence. At the same time, findings suggest that, in Germany, public confidence in science is growing.

D2 Updating the data available on early career researchers

- **Amended higher education statistics are improving the information basis on early career researchers, although there are still data gaps:** As of 1 March 2016, when the amended German Higher Education Statistics Act (HStatG) was implemented, the data collected in higher education statistics has been extended. At the same time, the new reporting obligations pose technical and organisational challenges for HEIs. An analysis of completeness and data quality carried out by the Federal Statistical Office in reference year 2017 still found data gaps. One way of resolving this problem would be to conduct separate evaluations for academic staff with and without a doctorate.
- **New longitudinal studies and data links will continue to hone the monitoring of early career researchers:** Longitudinal surveys of young academics, such as the DZHW's Nacaps project (National Academics Panel Study) and the Graduate Survey Cooperation Project (KOAB), provide important information on monitoring early career researchers, some of which is publicly accessible (on the Nacaps data portal).

National Report on Early Career Researchers 2021

Statistical Data and Research Findings on Doctoral Candidates and Doctorate Holders in Germany

The report presents empirical findings concerning the situation of early career researchers in Germany. The 2021 report focuses on the career paths pursued by doctorate holders and looks at their working and employment conditions, the qualification requirements during their doctoral studies, their transitions into further training and their career paths and prospects after earning their doctorate. It also provides insights on staff structure, personnel development and mobility patterns, it examines the compatibility of family life and an academic career, and it offers an analysis of individual disciplines.

The provided data used for the report is taken from official statistics and the results of regular surveys. In processing the data, emphasis is placed on the comparability and evaluation of the findings. The report provides a knowledge base for higher education institutions and research facilities, stakeholders, funding organisations and decision-makers in the federal government and the federal states.

