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Working-time mismatch and job satisfaction of junior academics

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Abstract

We examine the role of working-time mismatches (defined as the difference between actual and desired weekly working hours) in academics' job satisfaction. In doing so, we investigate how academics' career stage (predoc vs. postdoc) and contract status (part-time vs. full-time employment) moderate the relation between a mismatch in working hours and job-related well-being. Our results are based on longitudinal survey data among junior academics in the STEM fields indicate that mismatches in working hours are prevalent in academia and are associated with a loss of job satisfaction. In this context, overemployment (working more than desired) tends to unfold more severe consequences with respect to job satisfaction compared to underemployment. We find evidence for a similar reaction of doctoral students and postdocs with respect to job satisfaction when experiencing a working-time mismatch. Part-time employment positively moderates the link between working-time mismatch and job satisfaction for the case of underemployment.

Keywords Working time mismatch · Job satisfaction · Part-time employment · Academia

JEL Classification J22 · J28 · M53

1 Motivation and related literature

The academic culture is traditionally related to the ideal of a deep devotion to science, where the boundaries between work and life are highly blurred. Over the last decades, however, different reforms have significantly transformed the

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academic landscape. Furthermore, the higher education sector has experienced a substantial growth due to attracting increasing numbers of doctoral students and doctorate holders. In Germany, for instance, a doctorate not only qualifies for a career in academia but also acts as an educational signal for jobs in the private sector (Franck and Opitz 2007; Engelage and Schubert 2009). According to Rhoades (1998), academics have become “managed professionals” who have partly exchanged academic freedom and self-imposed choice of working time for externally driven pressure towards higher productivity and heavy competition (Jacobs and Winslow 2004; Musselin 2005). Consequently, it can be assumed that the group of academics has become more heterogeneous, so that terms such as “academic calling” do not apply to all academics to the same extent.

Recent studies indicate that increased workloads and time pressures constitute central sources of stress among academics (Winter et al. 2000; Winefield et al. 2002; Tytherleigh et al. 2005; Anderson 2006). Jacobs and Winslow’s (2004) study results further reveal that an increased number of working hours is positively related to academics’ dissatisfaction with the workload among overworked full-timers, thus indicating that the working time is not voluntarily chosen, but is rather a response to institutional and structural constraints.

Although excess work is widespread among academics, according to McInnis (1999) not the number of hours worked per se outlines the problem, but rather the consequences of the increased workloads for quality, productivity, and also fundamental work motives. Our conjecture is that a meaningful share of academics works an actual number of hours that does not match their working-time preferences. These incongruences might appear in both directions. On the one hand, non-standard work arrangements, such as part-time employment, have become more widespread in academia (Waijjer et al. 2017). Hence, some academics may find themselves in underemployment and prefer to work more hours. On the other hand, the number of tasks and obligations can lead to a situation where other academics work more hours than preferred and have to cope with overemployment. With respect to job satisfaction, Wooden et al. (2009) argue that the degree to which the actual working hours are in harmony with the preferences is much more relevant for job-specific well-being than the absolute number of working hours is.

Hence, a growing body of research has examined the relevance of whether working hours are in harmony with employees’ preferences. Empirical studies demonstrate the prevalence of discrepancies between actual and preferred working hours (Merz 2002; Böheim and Taylor 2004; Drago et al. 2005), factors determining tensions in working hours (Reynolds 2003; Otterbach 2010), and consequences of working time mismatches on various employee and organizational outcomes (van Emmerik and Sanders 2005; Grözinger et al. 2008; Wooden et al. 2009; Wunder and Heineck 2013; Lee et al. 2015; Otterbach et al. 2016). Based on the German Socio-Economic Panel, Grözinger et al. (2008) find that negative effects of a working time mismatch are the highest for job satisfaction compared to other dimensions of well-being, such as life and health satisfaction. Wooden et al. (2009) conclude that working time mismatches have adverse effects on both life and job satisfaction, but that overemployment constitutes a more severe problem compared to underemployment.

These previous studies do not focus on academia. Since academics differ in some unique features, e. g. regarding the investments in human capital and fundamental work motives (Bozeman and Gaughan 2011), the aforementioned results should not directly be transferred to the group of academics. Studies comparing job satisfaction of doctorate holders across academic and non-academic sectors uncover differences in job-related satisfaction (Bender and Heywood 2006; Di Paolo 2016). Thus, the relationship between working time mismatch and job satisfaction needs to be examined in more detail for this specific group.

Although the higher education literature has already concerned itself with determinants of academics' job satisfaction (e.g. Hagedorn 1996; Bellamy et al. 2003; Bozeman and Gaughan 2011), the role of working time mismatch and its effects on job satisfaction have not received much attention so far. In terms of working hours, the higher education literature tends to focus on academics' allocation of time between research and teaching (Link et al. 2008; Allgood and Walstad 2013; Barham et al. 2014; Bak and Kim 2015), the problem of increased workloads in academia (Kinman and Jones 2008; Kyvik 2013; Sang et al. 2015) and their effects on faculty satisfaction (Jacobs and Winslow 2004; Houston et al. 2006; Bentley et al. 2015; Escardiul and Afcha 2017). For instance, Bozeman and Gaughan (2011) find that spending more working time on teaching is associated with a reduction in job satisfaction for the sample of tenured and tenure track professors. Devoting more hours to research and to writing grants proposals, however, were not linked to job satisfaction. Feld et al. (2015) show that spending more time on research is associated with higher life satisfaction for economists.

Even though both streams of research have addressed negative outcomes of long working hours and increased workloads, empirical evidence on the existence and consequences of mismatches in working hours within the higher education context (for the case of academics in particular) is still underexplored. Accordingly, the paper at hands seeks to combine the two strands of literature by examining how mismatches in working hours affect the job satisfaction of academics at the predoc and postdoc stages. By doing so, we contribute to the existing academic knowledge on academic job satisfaction and working time mismatch by further exploring their linkage. We make use of an own panel study among junior academics predominantly from STEM fields and address differences between doctoral students and postdocs as well as the role of part-time contracts. Sustaining a high morale and job satisfaction among young researchers in academia is of high relevance for "the quality and vitality of the academic enterprise" (Johnsrud and Rosser 2002: 538).

The remainder of this paper proceeds as follows: In the next Sect. 2, we refer to theoretical approaches and derive hypotheses. In Sect. 3, we describe our data set, sample, variables, and empirical methodology. Section 4 presents the results. In Sect. 5, results of further robustness checks are elaborated. In Sect. 6, we discuss the limitations of our study. A conclusion follows in Sect. 7.

2 Theoretical considerations and hypotheses

A broad variety of job and employee characteristics can lead to the formation of mismatches. Such mismatches occur as a result of a combination of employees' "needs, interests, values, and expectations on the one hand and the characteristics and rewards associated with their jobs and organizations on the other" (Kalleberg 2008: 25). Potential discrepancies between jobs and people may arise because of skills or preferences. There are different categories of mismatches that are, for instance, related to over- and underqualification, geographical location, inadequate earnings, work family conflicts, and time preferences (Kalleberg 2008). In this paper, we focus on working time mismatches that refer to the discrepancy between actual and preferred working hours. Such mismatches could exist in both directions. While overworking means that a person is working in excess of their preferred hours, underworking implies that the desired hours exceed the actually worked hours (Kalleberg 2008).

Person-environment fit models (French et al. 1974; Edwards 1991; Kristof 1996) provide a useful theoretical framework to explain the consequences of a mismatch in working hours for job-related well-being. Person-environment fit is defined "as the comparability between an individual and a work environment that occurs when their characteristics are well matched" (Kristof-Brown et al. 2005: 281). On the occupational level, the *person-job fit* addresses the match between the employee and her or his job. According to Edwards (1991), there are two conceptualizations of the person-job fit. The *demands-abilities fit* occurs when the demands of the job are in line with employees' knowledge, skills, and abilities. Complementarily, the *needs-supplies* or *supplies-values fit*, as the second type, represents the compatibility of employees' needs, desires, or preferences, and the resources and rewards provided by their actual jobs (Caplan 1987; Edwards et al. 1998; Kristof-Brown et al. 2005). According to person-job fit theory, a misfit of both types results in psychological (e.g. job dissatisfaction, anxiety), physiological (e.g. blood pressure), and behavioral strain (e.g. absenteeism, smoking) (Caplan et al. 1980; Edwards et al. 1998). Numerous empirical studies substantiate the theoretical predictions of the person-job fit models (Bretz and Judge 1994; Saks and Ashforth 1997; Kristof-Brown et al. 2005).

Differences between academics' actual and preferred working hours can be considered to be an indicator of a poor person-job fit. Academics who experience a misfit because their need for a certain amount of working time is not met tend to be exposed to higher levels of stress, thus resulting in lower subjective well-being and job satisfaction. We expect this to apply to both overworking and underworking. Because a greater incongruence between actual and desired working hours as a form of violation of preferences will lead to dissatisfaction, our baseline hypothesis is

Hypothesis 1: The extent of working time mismatch is negatively related to job satisfaction.

In accordance with person-job fit theory, individuals tend to pursue career trajectories that match their preferences the best. Empirical studies demonstrate that job changes enable individuals to resolve working time mismatches (Merz 2002; Böheim and Taylor 2004; Reynolds and Aletraris 2006; Knaus and Otterbach 2019). Such a turning point in academic careers constitutes the completion of doctoral studies. Thus, the relationship between working time mismatch and job satisfaction is assumed to vary with career stage (predoc vs. postdoc).

We expect doctoral students to constitute a more heterogeneous group with respect to academic career orientation and preferences for working time compared to postdoctoral researchers. First, doctoral students may start doctoral training for various reasons. From the international perspective, in Germany the doctorate also acts as a strong signal of managerial talent (Franck and Opitz 2007). In Davoine and Ravasi's (2013) comparative study with biographical and career related information on 911 top managers employed by 111 companies in Germany, France, Great Britain, and Switzerland, around half of German managers held a doctoral degree. In France and Great Britain, the share of managers with a doctorate was considerably smaller (6–7%). According to the Career Tracking Survey of Doctorate Holders, 40% of their respondents were employed in non-academic sectors (Boman et al. 2017). Thus, a substantial part of doctoral students will leave academia after completion of their doctorate. Actual and preferred time investment may diverge for those doctoral students who have been planning a career outside academia from the onset.

Second, over the course of their doctoral studies, doctoral students gain more insights into their own career preferences. McAlpine and Emmioglu's (2015) findings suggest that doctoral students can develop a discouraging view of the academic opportunity structures, which hinders their pursuit of an academic career. In their longitudinal study, Roach and Sauermann (2017) reveal PhD students' declining interest in an academic research career over the course of their postgraduate training. Their findings indicate that nearly one-third of doctoral students who start their doctoral education with an interest in an academic career have lost that interest completely by the end of their graduate training. The authors argue that the decrease is not only caused by PhD students' labor market expectations (limited faculty job availability, postdoctoral requirements or the availability of research funding), but rather stems from transformation of PhD students' preferences for certain characteristics of an academic career. A declining interest in an academic career may be associated with a greater incongruence between actual and desired working hours. Considering these results, we expect that after the completion of the doctorate, only those individuals with high preferences for academia will pursue this career path. In this sense, the end of the doctoral process can be seen as a marking point that separate those individuals with a strong academic career orientation from those with a weaker one.

In contrast to doctoral students, postdoctoral researchers could have developed more consolidated academic career orientations through spending more years in academia and internalizing academic values and norms to a greater extent. This could result in a greater alignment of actual working time and working time preferences among postdoctoral researchers. In their international faculty working

time study, Bentley and Kyvik (2012) demonstrate that professors share similar working time patterns across different countries. The authors explain the results with institutional theory and the process of normative isomorphism. Institutional isomorphism means that “institutions in the middle or lower ranks of the hierarchy try, consciously and unconsciously, to emulate institutions at the top” (Milem et al. 2000; p 456). Academic career progression requires following certain codes of conduct and working time patterns that are imitated by other faculty and enhanced by the academic reward system (Milem et al. 2000; Bentley and Kyvik 2012). The process of normative isomorphism, through which academics adapt or drop out of academia, would affirm the idea of higher similarity at higher academic ranks. Consequently, a higher person-job fit is expected among postdoctoral researchers which is accompanied by (a higher preference for working longer hours and) a greater congruence between desired and actual working hours.

Hypothesis 2a: The extent of working time mismatch is lower among post-doctoral academics compared to doctoral students.

Experiencing a mismatch in working hours could trigger different reactions with respect to satisfaction at different career stages. In the context of our paper, academic career stage indicates whether the academic is in employment at the predoc or postdoc stage. Given individuals with a comparable extent of working time mismatch, a greater discrepancy between actual and preferred working hours, is assumed to have a more detrimental impact on job satisfaction for post-doctoral researchers than for doctoral students.

At the predoc stage, doctoral students are expected to willingly accept the transitory period of overworking or underworking in order to earn the doctorate without adverse consequences for job satisfaction. During doctoral training a positive discrepancy between actual and preferred working hours can be rather seen as a career investment that pays off in the future. Since the completion of doctoral studies can be seen as a natural exit point from academia, academics who are not willing to adapt their working time preferences are presumed to resolve their mismatch by leaving academia. Although from the perspective of the person-job fit theory a higher mismatch in working hours reflects a greater misfit between the individual and the job, at this career stage the majority of academics could perceive this mismatch as temporary.

Working as a postdoctoral researcher in academia signals the intention of pursuing an academic career. Studies showing that academic job satisfaction is positively associated with the academic rank (Holden and Black 1996; Oshagbemi 2003; Ssesanga and Garrett 2005) underline the assumption of a better person-job fit among postdocs. Hence, a higher mismatch in working hours could reflect a poorer person-job fit and consequently lead to severe consequences for the job-related well-being of postdocs. Furthermore, modifying their academic career plans may also entail higher sunk costs for postdocs, since they are more advanced in their careers. Based on these considerations, we expect the effects of a working time mismatch on job satisfaction to be less pronounced among

doctoral students compared to postdoctoral researchers. Thus, our second hypothesis is formulated as follows:

Hypothesis 2b: The negative relationship between a mismatch of working hours and job satisfaction is stronger for postdoc-stage academics than for predoc-stage academics.

Contractual conditions, such as part-time employment, could also affect job satisfaction to a large extent. In contrast to professors, who are predominantly full-time and permanently employed, part-time employment contracts are quite wide-spread in academia, among predoc-academics in particular (Teichler 2008). Although the prevalence of part-time employment varies by discipline, this employment form is increasingly becoming a common practice in academia, and has been a major issue of debates on employment conditions of early career stage academics in Germany (Teichler 2008; Jacob and Teichler 2011). According to Bundesbericht Wissenschaftlicher Nachwuchs (2017), 48% of academics in natural sciences and mathematics and 18% in engineering (under 45 years, professors excluded) are employed on a part-time basis at German universities.

The relationship between part-time work and job satisfaction is ambiguous. On the one hand, a positive link could be assumed due to the possibility of combining working and caring responsibilities when working part-time (Booth and Van Ours 2008). On the other hand, a negative link could be primarily justified by lower compensation and other disadvantageous job facets, such as a lack of opportunities for career advancement, low job prestige, and underutilization of skills, compared to full-time employment (Maynard et al. 2006; Booth and Van Ours 2008).

Certainly, employees' desires will be relevant in this context (Beard and Edwards 1995; Maynard et al. 2006). Thus, it is essential whether a person is working on a part-time basis voluntarily or not. Following the person-job fit theory, negative consequences for job satisfaction are only expected when employment characteristics do not correspond with employees' desires. For example, holding a part-time job while preferring a full-time position could reflect a need-supply mismatch, where employees' actual hours do not meet their psychological need (Maynard et al. 2006). Empirical evidence underscores these considerations. Some studies find that differences exist not only between the group of part-time employed and their full-time counterparts, but also within the group of part-timers, depending on their motivations or the degree of voluntariness for entering the contingent employment form (Gappa and Leslie 1993; Feldman and Turnley 1995; Rajagopal and Lin 1996; Anthony and Valadez 2002; Leslie and Gappa 2002). In this context, Russo (2012) also claims that there is much heterogeneity among part-time workers. While some individuals decide to choose part-time work in order to correspond "to the prescription of the identity to which they adhere" (Russo 2012: 315), some part-timers decide to do so due to their inability to combine competing multiple identities or roles. Maynard and Joseph (2008), for instance, show that solely involuntary part-time faculty were less satisfied with facets of job satisfaction, such as advancement, compensation, and security, compared to full-time faculty or voluntarily employed part-time faculty.

Despite the importance of bearing in mind the heterogeneity of preferences and attitudes of part-time faculty when entering this employment form, the

aforementioned results can probably not be directly transferred to the German higher education context. The majority of recent studies on job satisfaction employ national survey data from English-speaking countries where institutional backgrounds and academic career systems differ from those in Germany.

Independently of the degree of voluntariness, we would expect part-time academics to experience a more severe loss of job satisfaction compared to full-time academics when experiencing a working time mismatch. Part-time work should rather constitute an instrument to prevent overemployment (Iseke 2014) and to better balance different roles in the private and professional life domains. For part-time employed academics, the probability of being overemployed should be lower than among their full-time employed peers. The meritocratic reward structure, the relatively high competition in academia, and consequently frequent overtime hours among academics, however, may lead to the presence of overemployment among part-time academics. Overemployed part-time academics might suffer to a stronger extent from an inability to integrate their private life and professional life activities successfully and an ensuing difficulties in complying with the identity to which they adhere (Russo 2012).

Underemployment, on the other hand, could emerge as a result of external restrictions. The risk of being underemployed should be higher among those working on a part-time basis. Perceiving a greater misalignment between their desires and needs and the rewards of an academic job as a part-time academic, means investing even more time in order to keep up with the performance of their full-time counterparts, while achieving less compensation because overtime hours are not compensated in academia.

Based on these considerations, we expect that the group of part-time employed academics, independently of the degree of voluntariness in choosing this employment status, will react in a more sensitive manner to potential working time mismatches with regard to job satisfaction than full-time employed academics will. Thus, our third hypothesis is

Hypothesis 3: The negative relationship between a mismatch of working hours and job satisfaction is stronger for part-time employed than for full-time employed academics.

3 Data, variables, and methodology

The analysis is based on data from a longitudinal online survey on careers of young academics predominantly coming from the STEM disciplines (science, technology, engineering, and mathematics). Data were collected between 2014 and 2018 and consist of overall eight survey periods at 6-months intervals. Participants were recruited via different channels. First, we contacted German technical universities and research institutions asking them to forward information about our online survey to potential participants. Second, we collected e-mail addresses of potential doctoral students and postdocs working at German technical universities and research institutions and directly sent them information on our project. As an incentive, participants

who completed a questionnaire had the opportunity to take part in a lottery with 123 cash prizes (20–500€) after each survey period.

We restrict our sample to doctoral students and postdocs (assistant professors (*Juniorprofessor*) included) primarily working in academia, i.e. universities or other research institutes. We excluded employees with contracts of less than 15 weekly hours and more than 42 weekly hours. Besides, we exclude those participants who are not employed or are on parental leave at the time of the survey or reported incomplete answers with respect to the variables of interest. These restrictions lead to an unbalanced panel¹ of 6058 observations with 1949 individuals. 59% (3573) observations can be assigned to doctoral students and 41% (2485) to postdocs.

3.1 Variables/measures

3.1.1 Job satisfaction

Job satisfaction is our dependent variable. It is assessed at each of the eight survey measurement points with the following item: “Generally speaking, I am very satisfied with this job”. Participants reported how much they agreed with this statement on a six-digit scale ranging from one (not at all) to six (very much). Consistent with previous research on faculty job satisfaction (Bozeman and Gaughan 2011), the individuals in our sample are quite satisfied with their jobs (averaging 4.32 on a 6-point scale), so that the distribution of the pooled job satisfaction variable is rather skewed to the right. Around 15% of the respondents within the pooled sample selected the maximum score on the job satisfaction scale. On average, postdocs ($M=4.51$, $SD=1.16$) reported a somewhat higher job satisfaction compared to doctoral students ($M=4.20$, $SD=1.27$). The difference is highly significant ($t(6056)=-9.57$, $p<0.001$). We also observe gender-specific differences in job satisfaction. Male academics are significantly more satisfied with their jobs ($M=4.37$, $SD=1.22$) compared to female respondents ($M=4.25$, $SD=1.27$) based on a two-sample t-test. Besides, we find that part-time employed academics report to be significantly less satisfied with their jobs ($M=4.13$, $SD=1.31$) in comparison to their full-time employed counterparts ($M=4.40$, $SD=1.20$). A histogram of job satisfaction for the three groups of underemployed ($M=4.37$, $SD=0.08$), overemployed ($M=4.26$, $SD=0.02$), and matched ($M=4.65$, $SD=0.04$) is displayed in Fig. A1 in the Appendix.

3.1.2 Actual working hours, desired working hours, and working time mismatch

In the online survey, participants provided self-reports on the number of average weekly working hours (including paid or unpaid extra hours). Subsequently we refer to them

¹ Participants are not required to be surveyed at all survey periods in order to be included in the sample. We have checked that panel mortality does not affect the sample structure in terms of socio-demographics. Later dropouts report slightly lower values jobs satisfaction than individual who stay in the sample, though.

as *actual working hours*. Additionally, we asked the participants to report the average number of weekly hours they would prefer to work.² We refer to these as *desired working hours*. The subjects in our sample were working on average 45.44 h per week ($SD=8.14$). Doctoral students and postdocs report similar actual weekly hours on average. One in ten respondents reports working 55 or more hours per week.

Desired working hours are considerably lower than the actual working hours. On average, the respondents would like to work 38 h per week. The mean is slightly lower for doctoral students ($M=37.72$, $SD=6.47$) compared to postdocs ($M=38.43$, $SD=6.95$). The difference is also significant ($t(6056)=-4.08$, $p<0.001$).

Since the focus is on assessing the extent of the mismatch in working hours, the *working time mismatch* is conceptualized as the difference between *actual* and *desired* weekly working hours. Positive values indicate the individuals' overemployment with regard to their preferences, whereas negative values indicate underemployment. The latter case is hardly relevant in our sample and concerns 4.5% of all observations. In contrast, the incidence of overemployment is considerable in our sample (80%). Compared to this, findings based on SOEP data in 2004 show that around 54% of the participants are classified as overemployed and 18% as underemployed (Grözinger et al. 2008). 84% of the full-time academics and 71% of part-time academics are working in excess of their preferred working hours. Doctoral students more often report working in excess of their desired hours (81.8%) compared to their colleagues at the postdoctoral stage (78.5%). The relatively high share of overemployed academics among part-timers could hint at the involuntariness of this employment form. Substantial gender-specific differences in the incidence of overemployment are not observable.

On average, the participants report having a mismatch of about 7.43 h per week. While overemployed participants work about 9.64 more hours per week than they would like to, among underemployed participants the mismatch is around 7.4 h per week. The results are roughly in line with those of Grözinger et al. (2008), even though the extent of overemployment is more pronounced in our sample. The mismatch in working hours is slightly higher among doctoral students ($M=7.70$, $SD=7.62$) compared to postdocs ($M=7.03$, $SD=7.63$). The difference is significant and in line with our conjecture. The dispersion regarding working time mismatch is similar across the two groups and ranges between 0 h (10th percentile) and 15 h (90th percentile). The average extent of working time mismatch is around one hour lower for part-time employed academics ($M=6.06$, $SD=7.76$) compared to full-time employed ($M=7.95$, $SD=7.52$). The difference is also significant ($t(6056)=8.73$, $p<0.001$).

We employ the absolute values of the difference between actual and desired working hours ($M=8.08$, $SD=6.93$) in our analyses, so that negative and positive deviations are weighted equally.

² Note that the question does not explicitly indicate proportional variations in income/earnings, which are normally associated with changes in working hours.

Table 1 Sample descriptive statistics

	Whole sample (<i>n</i> = 6058)			
	Mean/share	SD	Min	Max
Job satisfaction	4.32	1.24	1	6
<i>Working hours</i>				
Actual working hours	45.44	8.14	15	100
Preferred working hours	38.01	6.68	0	80
Working time mismatch ^a	7.43	7.64	−40	86
Working time mismatch (absolute)	8.09	6.93	0	86
<i>Career stage</i>				
Postdoc (1 = yes)	0.41		0	1
<i>Socio-demographics</i>				
Age	30.85	3.80	24	54
Male (1 = yes)	0.61		0	1
Children (1 = yes)	0.25		0	1
Partner (1 = yes)	0.80		0	1
<i>Job characteristics</i>				
Part-time contract (1 = yes)	0.28		0	1
Job/research focus (1 (basic) to 6 (applied))	3.48	1.52	1	6
#Conference talks	7.15	9.79	0	111
<i>Teaching load</i>				
= 0 h per week	0.43			
≤ 2 h per week	0.25		0	1
≤ 4 h per week	0.17		0	1
> 4 h per week	0.15		0	1
Social support	3.72	1.31	1	6
<i>Personality traits</i>				
Extraversion	3.30	0.89	1	5
Agreeableness	3.25	0.74	1	5
Conscientiousness	3.88	0.61	1	5
Neuroticism	2.84	0.88	1	5
Openness to experiences	3.77	0.70	1	5
<i>Measurement points</i>				
T1	0.23		0	1
T2	0.19		0	1
T3	0.16		0	1
T4	0.11		0	1
T5	0.10		0	1
T6	0.08		0	1
T7	0.07		0	1
T8	0.06		0	1

^aMaximum value of the work-hours mismatch: Respondent has a 40 h/week contract, works 40 h/week, desired to work 80 h/week; minimum value of the variable working time mismatch: Respondent has a contract of 40 h/week, actually works 95 h/week, desires to work 9 h/week

3.1.3 Controls

Several controls are used for the empirical analysis. Table 1 displays the descriptive statistics of study variables (see Table A1 in the Appendix for a detailed description of our variables).

Because job satisfaction may vary depending on the career stage, we consider a dummy variable indicating whether the respondent is a *postdoc* (1 = yes). As job satisfaction is known to be influenced by employment-contract-specific arrangements, we control for *part-time employment* defined as working time contracts of less than 35 h per week (1 = yes). Additionally, junior academics may vary in their job-related attitudes depending on the type of job they occupy. We therefore ask the participants to characterize their *job focus* on a 6-digit scale as to whether their *job focus* is ranging from very basic/research contents (1) to very applied or practical job/research contents (6).

There is empirical evidence that the amount of time an academic dedicates to research activities is positively linked to satisfaction (i. e. Bak and Kim 2015; Feld et al. 2015). On the one hand, we therefore consider the overall number of *conference talks* that our participants have given at the time of each survey measurement point. We use this variable as the amount of time dedicated to research as well as a proxy for the participants' academic performance. On the other hand, we include a categorical variable *teaching load* in our analyses. The variable is divided into the following categories: Teaching load = 0 h per week (reference), teaching load ≤ 2 h per week, teaching load ≤ 4 h per week and teaching load > 4 h per week.

A number of researchers have stressed the link between universities' and colleagues' support/supporting culture and job satisfaction (Olsen et al. 1995; Lacy and Sheehan 1997; Bilimoria et al. 2006). In order to capture the importance of social relationships, we control for the variable "social support" of the academic department. We assessed social support with the following three items (Mentor Role Instrument (MRI) scale by Ragins and McFarlin (1990); German version: Schneider (2009) from the perspective of the protégée; adapted): 'In my work environment, there are people who provide support and encouragement', '[...] guides my professional development' and '[...] suggests specific strategies for achieving career aspirations'. The respondents had to rate on a 6-digit scale ranging from 1 (*not at all*) to 6 (*very much*) how much they agreed with each statement. The variable social support is standardized for the analysis (mean = 0 and standard deviation = 1).

Individuals with different personality traits may be dispositional to different levels of job satisfaction. In their meta-analysis Judge et al. (2002) find support for the dispositional source of job satisfaction, when traits are organized with the five-factor model, in particular. The Big Five model approximates an individual's whole personality by five factors, namely extraversion, openness to experience, conscientiousness, neuroticism, and agreeableness (Costa and McCrae 1992). In order to account for the dispositional nature of job satisfaction, we control for the individual's calculated indices of these five personality traits. As measures, we use the short version of the Big Five Inventory, which consists of 21 items (BFI-K; Rammstedt and John 2005). Each Big Five trait is assessed by four items, with the exception of "openness to experience", which is measured with five items. The participants indicate on a

5-digit scale ranging from 1 (*not at all*) to 5 (*very much*) how much they agree with each statement. Each personality trait is standardized for the analysis (mean = 0 and standard deviation = 1).

Last, we control for socio-demographic variables, such as age (in years), gender, having a partner (1 = yes), and whether the participants have children (1 = yes).

3.2 Empirical strategy

We apply ordinary least squares (OLS)³ and fixed effects estimations based on the whole sample in order to analyze the relation between the (absolute) extent of the working time mismatch and job satisfaction.

Our overall estimation model can be described as:

$$\begin{aligned}
 JS_{i,t} = & \beta_0 + \beta_1 \text{Working time mismatch}_{i,t} + \beta_2 \text{Postdoc}_{i,t} \\
 & + \beta_3 \text{Part-time work}_{i,t} + \beta_4 \text{Working time mismatch} * \text{Postdoc}_{i,t} \\
 & + \beta_5 \text{Working time mismatch} * \text{Part-time work}_{i,t} + \gamma \text{Controls}_{i,t} + \varepsilon_{i,t}
 \end{aligned}$$

The individual job-related well-being is represented by the ordinal variable *JS*. Apart from the two dummies for being at the postdoctoral stage and having a part-time contract, we also include the two interaction terms *Working time mismatch*Postdoc* and *Working time mismatch*Part-time work* into our analysis. Besides, we include further variables, as described above, in the vector *Controls*.

4 Main results

The results of pooled OLS and fixed effects estimations for the whole sample are reported in Table 2. We start with Model (1 in which we only include the variables *working time mismatch*, *postdoc* and further socio-demographics into the analysis. A higher (absolute) mismatch in working hours is significantly and negatively related to the young academics' job satisfaction. Academics who report having a greater (absolute) incongruence between the desired and actual working hours tend to be less satisfied with their jobs. Additionally, the results show a significant positive relation between being a postdoc and job satisfaction.

By taking further characteristics of the job as controls into account (model (2)), we observe neither a notable change in the regression coefficient of the variable *Working time mismatch* nor in its significance. In contrast to model (1), the significant effect of the variable *postdoc*, however, disappears. At first glance, one could think about the relevance of part-time work. In our sample, part-time employment is three times more prevalent among doctoral students (38.5%) than among

³ In accordance with previous research on subjective well-being, we estimate the regressions with the method of ordinary least squares that is based on the assumption of cardinality (Ferrer-i-Carbonell and Frijters 2004). Corresponding ordered-probit estimations yield very similar results and are reported in Table A2 in the Appendix.

Table 2 Pooled OLS and individual fixed effects estimations on job satisfaction

	Pooled OLS		Fixed Effects	
	(1)	(2)	(3)	(4)
Working time mismatch (absolute, in hours)	–0.028*** (0.003)	–0.026*** (0.003)	–0.024*** (0.003)	–0.016*** (0.003)
Postdoc (1 = yes)	0.258*** (0.054)	0.043 (0.049)	0.030 (0.046)	0.016 (0.068)
<i>Socio-demographics</i>				
Age (in years)	–0.009 (0.008)	0.004 (0.007)	0.004 (0.007)	
Male (1 = yes)	0.112** (0.051)	0.087* (0.045)	–0.007 (0.047)	
Children (1 = yes)	0.258*** (0.056)	0.243*** (0.049)	0.228*** (0.048)	0.176** (0.086)
Partner (1 = yes)	–0.074 (0.058)	–0.040 (0.050)	–0.044 (0.047)	–0.043 (0.071)
<i>Job characteristics</i>				
Part-time (1 = yes)		–0.155*** (0.050)	–0.146*** (0.048)	–0.231*** (0.073)
Job focus		0.027* (0.014)	0.025* (0.013)	0.022 (0.017)
# Conference talks		0.005** (0.002)	0.003 (0.002)	–0.004 (0.005)
<i>Teaching (Base: = 0 h per week)</i>				
< = 2 h per week		0.062 (0.045)	0.077* (0.043)	0.030 (0.048)
< = 4 h per week		–0.013 (0.053)	0.008 (0.052)	0.051 (0.052)
> 4 h per week		0.137*** (0.056)	0.131** (0.055)	0.094 (0.062)
Social support		0.493*** (0.021)	0.469*** (0.020)	0.281*** (0.025)
<i>Personality Traits</i>				
Extraversion			–0.040* (0.024)	
Agreeableness			0.020 (0.022)	
Conscientiousness			0.085*** (0.023)	
Neuroticism			–0.226*** (0.024)	
Openness to experiences			0.036* (0.022)	
Measurement point dummies	Yes	Yes	Yes	Yes
Intercept	4.703*** (0.240)	2.779*** (0.233)	2.972*** (0.324)	3.725*** (0.130)

Table 2 (continued)

	Pooled OLS		Fixed Effects	
	(1)	(2)	(3)	(4)
# Individuals	1,949	1,949	1,949	1,949
Observations	6058	6,058	6,058	6,058
R ² ^(a)	0.053	0.218	0.257	0.070

Notes: The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***. The variables social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences are standardized

^(a)The adjusted R² is reported for pooled OLS estimations, and the overall R² for the fixed effects estimations

postdoctoral researchers (12.7%). Further estimations, however, reveal that the difference between the two models tends to be driven by the variable “social support”. The highly significant relation between the reported perceived social support from the work department is in line with previous studies (Olsen et al. 1995; Lacy and Sheehan 1997; Bilimoria et al. 2006). Thus, our results lend support for the relevance of a supportive culture for academics’ job satisfaction. Further, the positive relation between teaching load and job satisfaction might be surprising at first glance because of time restrictions for other important tasks such as completing a thesis. However, it is likely that junior academics (doctoral students in particular) differ in their general “taste for science” (Roach and Sauermann 2010) including both teaching and research and scholars accordingly self-select to one or another task and position.

Including information on the respondents’ personality traits in model (3) does not change the aforementioned results with regard to the relevance of a working time mismatch for job satisfaction. The observed coefficients seem to be relatively small, though. When looking at the economic relevance (model (3)), an increase of one standard deviation ($SD=7$ h) in working- time mismatch is associated with a decrease in job satisfaction of about 0.17 job satisfaction points (14% of the standard deviation).

Besides, in accordance with previous research (e.g. Judge et al. 2002), we find support for the dispositional nature of job satisfaction. Two of the Big Five personality traits, namely conscientiousness and neuroticism, are highly significantly associated with job satisfaction. Academics scoring high in neuroticism are significantly less satisfied with their jobs. In contrast, academics who are characterized by a high conscientiousness tend to be significantly more satisfied. Extraversion is weakly related to job satisfaction ($p < 0.1$).

By running fixed effects estimations in model (4), we focus on within-individual variation with regard to working time mismatch and job satisfaction. The results strengthen our previous findings concerning the negative relationship between changes in the absolute extent of the working time mismatch and changes in job satisfaction. Overall, the results provide support for our baseline Hypothesis 1 that the extent of working time mismatch is negatively related to job satisfaction.

In order to analyze whether the relation between a working time mismatch and job satisfaction varies with career stage and part-time employment, we add the interaction terms *Working time mismatch * postdoc* and *Working time mismatch * part-time work* to our estimations. The results are displayed in Table 3. Starting with estimating OLS regression in model (1), the results show a weak significant interaction effect for *working time mismatch x postdoc* and job satisfaction. The corresponding fixed effects model (model (2)), however, does not reveal any statistically significant interaction effect. Hence, our Hypothesis 2b that doctoral students and postdocs react differently regarding job satisfaction when experiencing a working time mismatch is not supported. Analogously, we include an interaction term *Working time mismatch * Part-time work* in our analysis. Since the corresponding OLS estimation in model (3) yielded insignificant results, we do not observe part-time employed academics to react more sensitively to a working- time mismatch compared to full-time

Table 3 Pooled OLS and fixed effects estimations on job satisfaction (interactions)

	OLS		Fixed Effects		OLS	Fixed Effects	
	(1)		(2)		(3)	(4)	
Working time mismatch (absolute, in hours)	−0.028*** (0.004)		−0.013*** (0.004)		−0.023*** (0.003)	−0.018*** (0.004)	
Postdoc (1 = yes)	−0.046 (0.063)		0.058 (0.081)		0.032 (0.046)	0.017 (0.068)	
Part-time (1 = yes)	−0.145*** (0.048)		−0.230*** (0.073)		−0.101 (0.068)	−0.282*** (0.086)	
Working time mismatch * postdoc	0.010* (0.006)		−0.005 (0.006)				
Working time mismatch * part-time					−0.006 (0.007)	0.007 (0.007)	
<i>Socio-demographics</i>							
Age (in years)	0.003 (0.007)				0.004 (0.007)		
Male (1 = yes)	−0.006 (0.047)				−0.005 (0.047)		
Children (1 = yes)	0.231*** (0.048)		0.176** (0.086)		0.226*** (0.049)	0.180** (0.085)	
Partner (1 = yes)	−0.048 (0.047)		−0.043 (0.071)		−0.046 (0.047)	−0.042 (0.071)	
<i>Job characteristics</i>							
Job focus	0.026** (0.013)		0.021 (0.017)		0.025* (0.013)	0.022 (0.017)	
# Conference talks	0.003 (0.002)		−0.004 (0.005)		0.003 (0.002)	−0.004 (0.005)	
<i>Teaching (Base: = 0 h per week)</i>							
≤ 2 h per week	0.075* (0.043)		0.031 (0.048)		0.076* (0.043)	0.031 (0.048)	
≤ 4 h per week	0.008 (0.052)		0.053 (0.052)		0.008 (0.052)	0.051 (0.052)	
> 4 h per week	0.127** (0.055)		0.097 (0.062)		0.130** (0.055)	0.094 (0.062)	
Social support	0.468*** (0.020)		0.281*** (0.025)		0.468*** (0.020)	0.281*** (0.025)	
<i>Personality Traits</i>							
Extraversion	−0.039* (0.024)				−0.039* (0.024)		
Agreeableness	0.019 (0.022)				0.020 (0.022)		
Conscientiousness	0.087*** (0.023)				0.086*** (0.023)		
Neuroticism	−0.227*** (0.024)				−0.226*** (0.024)		
Openness to experiences	0.036* (0.022)				0.036 (0.022)		
Measurement point dummies	Yes		Yes		Yes	Yes	
							Yes

Table 3 (continued)

	OLS	Fixed Effects	OLS	Fixed Effects
Intercept	3.008*** (0.322)	3.708*** (0.130)	2.968*** (0.323)	3.737*** (0.131)
# Individuals	1,949	1,949	1,949	1,949
Observations	6,058	6,058	6,058	6,058
R ² (a)	0.257	0.192	0.257	0.192

Notes: The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***. The variables social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences are standardized

(a) The adjusted R² is reported for pooled OLS estimations, and the overall R² for the fixed effects estimations

employed academics.⁴ Estimating fixed effects in model (4) strengthens this finding. In that regard, Hypothesis 3 is not supported in general.

Apart from analyzing the relation between the (absolute) working time mismatch and job satisfaction, in the next step the focus is laid on disentangling the way in which different forms of a mismatch in working hours, namely under- and overemployment, affect academics' job satisfaction. Therefore, two separate regressions are performed for the group of academics with a working time mismatch greater than or equal to zero as well as those with a mismatch less than or equal to zero.⁵ The results are reported in Table 4.

We start with the OLS estimation in model (1) that includes the full set of the aforementioned controls for the subsample of overemployed and matched academics. Overall, the results are in line with our initial observations. Academics with more hours of overemployment, tend to be less satisfied with their jobs. Additionally, we test whether overemployment has a more adverse effect on job satisfaction among postdocs. The results reveal no significant interaction effect. In a similar vein, we include an interaction term *Working time mismatch * part-time work* in model (2). Analogously, the interaction is not significant, indicating no different reactions with regard to job satisfaction among part-time and full-time employed academics when experiencing overemployment.

In model (3) of Table 4, we turn our attention to the group of underemployed and matched academics. In accordance with the aforementioned estimations, we use the absolute number of hours in underemployment. These additional estimations reveal some differences. Although the coefficient of the variable *Working time mismatch* does not change dramatically, we now only observe a weak negative significant relation between the (absolute) extent of underemployment and job satisfaction. One has to note that underemployed academics constitute a considerably smaller group compared to overemployed academics. In analogy to model (1), we do not find a significant interaction effect for *Working time mismatch*postdoc*. In model (4), we include the interaction term *Working time mismatch*part-time work*. Inspecting the results, we first observe a strong significant relation between the (absolute) extent of underemployment and job satisfaction. Hence, full-time academics who report having more hours in underemployment suffer a stronger loss of job satisfaction ($p < 0.05$).⁶ This is also reflected by a greater coefficient compared to the aforementioned models. Second, the results show a significant interaction term *Working time mismatch*part-time work*. Thus, the decrease in job satisfaction for having greater

⁴ Group-specific pooled OLS estimations on job satisfaction for part-time and full-time junior academics (Table A3 in the Appendix) also reveal that working time mismatch is negatively associated with job satisfaction in both groups.

⁵ Note: The group of matched individuals (working time mismatch equal to zero) appears in both estimations. In many of previous studies on consequences of working time mismatches (Otterbach et al. 2016; Knaus and Otterbach 2019) the three groups of overemployed, underemployed and matched are contrasted in one estimation by including respective dummy variables, not allowing to draw conclusions on the extent of the working time mismatch, though.

⁶ In the analyzed subsample, the full-time academics are on average more satisfied with their job. This difference is statistically significant ($t(1182) = -5.28, p < 0.001$).

Table 4 Pooled OLS estimations on job satisfaction (mismatch ≥ 0 and mismatch ≤ 0 , interactions included)

	Mismatch ≥ 0		Mismatch ≤ 0		Mismatch ≥ 0		Mismatch ≤ 0	
	OLS		OLS		Fixed Effects		Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Working time mismatch (absolute, in hours)	-0.028*** (0.004)	-0.022*** (0.003)	-0.024* (0.014)	-0.044*** (0.015)	-0.014*** (0.004)	-0.018*** (0.004)	-0.005 (0.018)	-0.018 (0.025)
Postdoc (1 = yes)	-0.027 (0.063)	0.042 (0.047)	0.053 (0.102)	0.037 (0.095)	0.063 (0.084)	0.014 (0.070)	0.091 (0.181)	0.059 (0.174)
Part-time (1 = yes)	-0.160*** (0.050)	-0.101 (0.071)	-0.179* (0.094)	-0.275*** (0.101)	-0.214*** (0.077)	-0.260*** (0.090)	-0.599*** (0.175)	-0.638*** (0.184)
Working time mismatch * part-time		-0.008 (0.007)		0.049** (0.020)		0.007 (0.007)		0.015 (0.028)
Working time mismatch * postdoc	0.009 (0.006)		-0.000 (0.021)		-0.007 (0.006)		-0.013 (0.028)	
<i>Socio-demographics</i>								
Age (in years)	0.002 (0.007)	0.002 (0.007)	0.002 (0.012)	0.000 (0.012)				
Male (1 = yes)	-0.006 (0.047)	-0.005 (0.047)	0.129 (0.105)	0.132 (0.104)				
Child (1 = yes)	0.216*** (0.050)	0.210*** (0.050)	0.246*** (0.095)	0.249*** (0.094)	0.174** (0.086)	0.178** (0.086)	0.148 (0.210)	0.150 (0.209)
Partner (1 = yes)	-0.057 (0.047)	-0.056 (0.047)	0.019 (0.097)	0.020 (0.096)	-0.077 (0.070)	-0.075 (0.070)	0.025 (0.173)	0.032 (0.173)
<i>Job characteristics</i>								
Job focus	0.029** (0.013)	0.029** (0.013)	0.029 (0.025)	0.027 (0.025)	0.022 (0.018)	0.023 (0.018)	0.045 (0.042)	0.045 (0.042)
# Conference talks	0.003 (0.002)	0.003 (0.002)	0.008* (0.004)	0.009** (0.004)	-0.003 (0.005)	-0.003 (0.005)	-0.039** (0.020)	-0.038* (0.020)

Table 4 (continued)

	Mismatch ≥ 0		Mismatch ≤ 0		Mismatch ≥ 0		Mismatch ≤ 0	
	OLS		OLS		Fixed Effects		Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Teaching (Base: = 0 h per week)								
< = 2 h per week	0.076* (0.044)	0.076* (0.044)	0.148 (0.099)	0.150 (0.098)	0.041 (0.049)	0.041 (0.049)	0.108 (0.139)	0.111 (0.138)
< = 4 h per week	-0.003 (0.052)	-0.004 (0.052)	0.095 (0.116)	0.103 (0.116)	0.056 (0.053)	0.053 (0.053)	0.116 (0.124)	0.108 (0.124)
> 4 h per week	0.128** (0.056)	0.131** (0.056)	0.109 (0.111)	0.098 (0.110)	0.105* (0.062)	0.103* (0.062)	0.122 (0.152)	0.106 (0.152)
Social support	0.467*** (0.020)	0.467*** (0.020)	0.431*** (0.046)	0.428*** (0.045)	0.267*** (0.025)	0.267*** (0.025)	0.209*** (0.064)	0.210*** (0.063)
<i>Personality traits</i>								
Extraversion	-0.035 (0.024)	-0.035 (0.024)	0.016 (0.046)	0.017 (0.046)				
Agreeableness	0.023 (0.022)	0.024 (0.022)	0.039 (0.049)	0.047 (0.049)				
Conscientious- ness	0.081*** (0.024)	0.080*** (0.023)	0.139*** (0.052)	0.138*** (0.052)				
Neuroticism	-0.229*** (0.024)	-0.229*** (0.024)	-0.136** (0.054)	-0.134** (0.054)				
Openness to experiences	0.042* (0.022)	0.041* (0.022)	0.003 (0.050)	0.010 (0.050)				
Measurement point dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	3.029*** (0.334)	2.991*** (0.335)	2.266*** (0.608)	2.296*** (0.605)	3.762*** (0.132)	3.793*** (0.133)	4.149*** (0.324)	4.166*** (0.326)
# Individuals	1,904	1,904	624	624	1,904	1,904	624	624

Table 4 (continued)

	Mismatch ≥ 0		Mismatch ≤ 0		Mismatch ≥ 0		Mismatch ≤ 0	
	OLS		OLS		Fixed Effects		Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Observations	5,788	5,788	1,184	1,184	5,788	5,788	1,184	1,184
R ^{2(a)}	0.262	0.262	0.225	0.231	0.196	0.196	0.034	0.037

The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***

(a) The adjusted R² is reported for pooled OLS estimations, and the overall R² for the fixed effects estimations

hours of underemployment differs for full-time and part-time academics. However, the interaction coefficient is positive, indicating that full-time academics react more sensitively to an increase in underemployment hours compared to part-time employed. It has to be noted that underemployment is more prevalent among part-time employed (9%) in comparison to full-time employed academics (2%).

We also estimate fixed effects regressions accounting for within-person variations. While the results are in line with previous findings for the group of overemployed and matched academics (models (5) and (6)), we do not observe a relation between changes in the absolute extent of hours in underemployment and changes in job satisfaction (models (7) and (8)). Furthermore, when estimating fixed effects, the interaction term *Working time mismatch*part-time work* yields insignificant results.

Corresponding estimations of subsamples regarding working-time contracts confirm that working time mismatches of both full-time and part-time academics are negatively related to job satisfaction (see Table A3 in the Appendix).

5 Robustness checks

We perform additional estimations to check the robustness of our main results. Unless otherwise indicated, the following robustness checks are based on the re-estimation of the specifications (3) and (4) in Table 2.

First, we check the sensitivity of our results by excluding 3% of the initial observations with values belonging to the upper 5 percent in terms of actual working hours (more than 60 h per week) as well as desired hours (more than 50 h per week) (see Table A4, models (1) and (2) in the Appendix). Adjusting for statistical outliers leads to practically the same results as before. In accordance with the empirical evidence on the link between job changes and job satisfaction (e.g. Chadi and Hetschko 2018), working as a postdoctoral researcher after earning a doctorate might be accompanied by changes in responsibilities, working hours, and, thus, also in job satisfaction. Therefore, we further check whether our main results differ when we exclude observations where a change in doctorate status has occurred between two consecutive survey measurement points (see models (3) and (4) of Table A4 in the Appendix). This applied to around 3% of observations in our sample. Overall, the corresponding estimations reflect the robustness of our results.

Next, we are interested in whether actual working hours on their own adversely affect job satisfaction. Therefore, we re-estimate the main specifications (3) and (4) in Table 2 by using actual weekly working hours instead of the (absolute) difference between actual and preferred working hours as the focal independent variable (see Table A5 in the Appendix). Although we observe a significant negative relation between the number of actual weekly hours and job satisfaction, it is small in terms of the size of the coefficients though, when estimating pooled OLS in model (1). Corresponding fixed effects estimations in model (2), however, do not reveal a significant relationship between changes in actual working hours and changes in job satisfaction. This observation underscores the statements of Wooden et al. (2009) that working time mismatches are more relevant for job-related well-being than the number of hours worked are.

Because time spent at work reduces the time resources left to spend in other life domains, imbalances between actual and preferred working time are thought to adversely affect not only job satisfaction but also satisfaction with an individual's private life. We therefore additionally res-estimate our baseline specifications and examine whether the (absolute) extent of the working time mismatch is related to various facets of satisfaction. As alternative dependent variables we use the respondents' satisfaction with the opportunities within the last two months (i) to allocate the working time freely, (ii) to take leisure time, (iii) to take time for family and partner (each measured with a 6-digit scale: 1 = not satisfied at all, 6 = very satisfied).⁷ Furthermore, we investigated the relation between working time mismatch and satisfaction with private life.⁸ The results can be found in Table A6 in the Appendix. Inspecting the results leads to the conclusion that greater discrepancies between actual and preferred working hours are associated with less satisfaction regarding (i) private life, (ii) opportunities to allocate the working time freely and (iii) opportunities to take leisure time and (iv) time for family and partner.

Additional estimations, however, reveal that negative consequences are solely observable for overemployed scientists. These results are in line with the observations of Grözinger et al. (2008) and Wooden et al. (2009). Consequently, working in excess of the preferred hours is also associated with losses in quality of life.

The next robustness analysis refers to the problem that our estimated relationship between working time mismatch variable on job satisfaction may be distorted by the presence of endogeneity bias because it cannot be completely ruled out that the causation is multidirectional. In order to address concerns about reverse causality, we complement our analysis by adding the job satisfaction in the previous period, js_{it-1} , and apply Arellano-Bond-estimations (Arellano and Bond 1991). Corresponding results are displayed in Table A7 in the Appendix. Although this approach comes along with a substantial decrease in the number of observations,⁹ the results indicate nearly unchanged coefficients and significance of the (absolute) amount of the working time mismatch and provide support for the robustness of our results.

6 Limitations

The study at hand contributes to the existing body of research on working time mismatches and has extended it by adding insights for the group of young scientists working in academia. It also complements existing empirical evidence on determinants of faculty's job satisfaction. In doing so, it combines the two hitherto only loosely connected strands of research. Nevertheless, there are some limitations that have to be discussed.

⁷ Due to missing data and lack of information on these variables for the last two survey waves, the sample size is reduced by 0.13.

⁸ Due to missing data and lack of information on this variable, the sample size is reduced by 0.24.

⁹ The sample size is reduced by 0.66.

First, our question concerning the desired working hours do not include an indication concerning the proportional pay adjustment. It remains open as to how the respondents interpret this question and whether they actually would be willing to accept decreases in pay proportionally to decreases in actual working time. It is conceivable that the difference between actual and preferred working hours could turn out to be different if the question includes information on pay adjustment. This is relevant in particular, because overtime hours are usually not monetarily compensated in academia. The inaccuracy of the questions involved, also applies to possible misinterpretations with respect to the reference point. Although the wording and the placement of the question on the desired working hours within the questionnaire allows the conclusion that it is asking for desired actual hours, it could also be the case that some respondents actually refer to the desired contractual working hours (not taking potential overtime hours into account). This could be relevant for our sample in particular because of the relatively high proportion of part-time employed academics. When interpreting our results, one should consider these potential inaccuracies. In general, we agree with the conclusion of Sousa-Poza and Henneberger (2001) that the relation between different variables (i.e. contractual, actual, and desired working hours, overtime, and compensation of overtime hours) is complex and leaves room for speculation. Future research should encounter this issue by asking more precise questions.

Second, unfortunately our analysis lack information on detailed allocation of actual working hours for different activities, such as e.g. time for research, conference activities, laboratory work, administrative duties. We are only able to approximate this issue by including variables such as the teaching load and number of presentations at conferences. Future research is encouraged to include such components into the analysis in order to derive more accurate policy recommendations for the group of junior academics. Future work may also try to include the potential role of personal income or financial background in this context.

Third, the usage of single-item measures of job satisfaction can also be seen as critical. Whereas some authors emphasize the stableness of the single-item measure of overall job satisfaction (Scarpello and Campbell 1983), according to Oshagbemi (1999) the single-item measure tends to overestimate the share of satisfied respondents and underestimate that of less satisfied ones compared to a multidimensional measure. In a meta-analysis, Wanous et al. (1997) conclude that single-item measures of job satisfaction are reliable (correlation of 0.62–0.72 with other job satisfaction measures). We run additional estimations using a three-item measure of job satisfaction. Although the coefficients are much smaller, the results remain robust (see Table A8 in the Appendix). Thus, together with the empirical evidence, we expect the single-item measure to be a sufficiently good measure compared to a multidimensional approach.

Fourth, although throughout the different models we observe a statistically significant relationship between working time mismatch and job satisfaction, the size of the coefficients turns out to be rather small. Since our sample is relatively homogeneous, the respondents in our sample are on average quite satisfied with their jobs ($M=4.33$) and the variation ($SD=1.23$) is not great. Wunder and Heineck (2012) also observe small coefficients of overemployment, in particular. They argue that

in response to small losses in well-being due to overemployment, a potential gain in utility from reducing overemployment should also be small. An overemployed worker will only be willing to lower his working time if the gain in utility from adjusting is greater than the costs involved. Since adjusting working hours can often solely be achieved by a job change, the costs involved turn out to be very high. Nevertheless, this issue has to be explored in future research in more depth.

Job satisfaction comprises satisfaction with different aspects and facets of the job. The general measure of job satisfaction that we use does not allow us to uncover how the relation with regard to working time mismatch changes when accounting for different dimensions of academic work. It could be the case that non-pecuniary aspects of the academic work, like freedom to choose the research topics and interaction with the scientific community (Agarwal and Ohyama 2013; Roach and Sauermann 2010), outweigh the negative structural aspects in academia such as prevailing temporary contracts. Academics' satisfaction with the abovementioned non-pecuniary facets of the academic work could lead to a high job satisfaction within the sample and to relatively small effects with respect to a working time mismatch. Additionally, academics might compensate negative aspects of working more hours by autonomously choosing the hours in which they work and the activities on which they are to work. Young academics could also anticipate the high demands and expectation in academia, such as a high working time investment and thus, be mentally prepared. Integrating these facets of the academic work into analysis constitutes a promising avenue for future research.

Fifth, based on our results we cannot make statements about a clear causality. Although the longitudinal analyses rule out concerns about potential unobserved heterogeneity, a reversed causality could also be conceivable, i.e., that academics who are not satisfied with their jobs tend to desire fewer working hours.

Lastly, because of different culture, policy, and labor market conditions in different countries, which for their part have an effect on academics' experiences (Maynard and Joseph 2008), the transferability of our results to other countries should be viewed with caution.

7 Concluding remarks

This paper intends to illuminate the role of working time mismatches (incongruences between actual and desired working hours) for academics' job-related well-being by using a longitudinal survey data on careers of young academics in Germany. Furthermore, it examines whether the relationship between the working time mismatch and job satisfaction varies with academics' career stage (predoc vs. postdoc stage) and contract status (part-time vs. full-time employment). Although such

mismatches have been addressed for general samples of the workforce, empirical evidence for the specific group of junior academics is lacking. Within the higher education literature, however, the issue of incongruences between actual and desired working hours is underexplored. Thus, our results broaden the existing knowledge about academics' working time.

First, the incidence of mismatches among academics (overemployed, in particular) are considerable in spite of the high autonomy that academics have in choosing their working hours. High workloads and raising administrative duties on the one hand, and the highly competitive nature of the academic career on the other hand, may be potential reasons for the observed findings. Since a greater time investment is positively linked to publication productivity (Stack 2004; Albert et al. 2016), spending more working time is vital for professional academic advancement. In accordance with our baseline Hypothesis 1, we show that a greater absolute extent of working time mismatch is associated with a loss of job satisfaction. This is especially the case for overemployment.

The results do not provide evidence of more pronounced negative consequences of a working time mismatch on job satisfaction among postdoctoral researchers compared to doctoral students. Hence, doctoral students and post-docs seem to react similarly when experiencing a working time mismatch. We only find a statistically significant positive interaction effect between part-time employment and working time mismatch for cases of underemployed academics. Future research has to explore in more detail different reactions of overemployed and underemployed part-time faculty.

Our results have several implications for organizational policy and research. Previous research on job satisfaction of part-time faculty found no differences compared to full-time faculty when part-time is chosen voluntarily (Maynard and Joseph 2008). Apart from incongruences between the desired and actual contractual status (part-time/full-time), one should bear in mind that existing mismatches between actual and desired hours can constitute a source of dissatisfaction. The substantial incidence of overemployment in our sample indicates existing potential for improvement concerning a better balancing of the private and working spheres. Higher education institutions should pay attention to underemployment when determining contractual conditions in academia, too. This issue is also relevant for policy with regard to public universities. More recently, Lee et al. (2015) investigated how a (fully or partly) achieved work hour congruence affects employees' job satisfaction and absenteeism. Their results reveal positive changes in job satisfaction for previously underemployed employees when work hour congruence was fully or partly achieved.

As it has been presented above, discrepancies between actual and preferred working time also affect satisfaction with private life in a negative way. Since mismatches in working hours are shown to be associated with mental health problems (Angrave and Charlwood 2015; Otterbach et al. 2016), a better alignment between academics' needs and desires on the one hand, and the requirements of the job should be worth striving for. Empirical studies provide evidence for the beneficial role of mentoring support and self-management strategies for job satisfaction and career success (Murphy and Ensher 2001). The development of self-management skills and university support could improve the situation of overload and reduce negative effects of such a mismatch. Addressing this problem would be useful from the perspective of the higher education institutions in order to improve the quality of research and motivations of academics.

Appendix

See Fig. A1 and Tables A1, A2, A3, A4, A5, A6, A7 and A8.

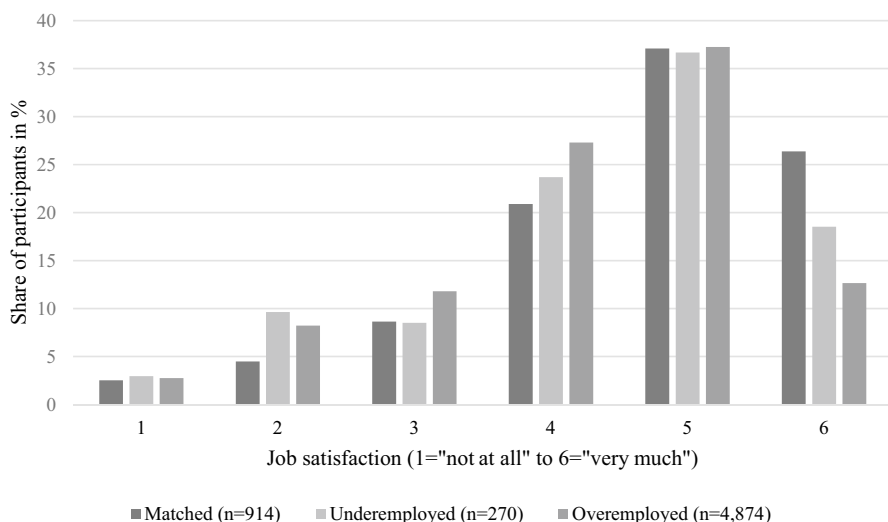


Fig. A1 Distribution of job satisfaction

Table A1 Variable definitions and operationalizations

Variables	Description
Actual working hours	Average actual working time per week (in hours)
Preferred working hours	Average working time a respondent prefers to work per week (in hours)
Working time mismatch	Computed as the subtraction of actual and preferred weekly working hours
Part-time	Dummy for part-time employment (contractual hours less than 35 h per week) (1 = yes)
Job satisfaction	Overall satisfaction with the job, measured on a 6-digit scale from 1 (not at all) to 6 (very much); Item wording: “Generally speaking, I am very satisfied with this job”
Postdoc	Dummy for postdoc working in academia (universities, research institutions) (1 = yes)
Male	Dummy for males (1 = yes)
Age	Participant’s age (in years) calculated from the information on a participant’s birth year
Children	Dummy for children (1 = yes)
Partner	Dummy for partner (1 = yes)
# conference talks	Self-reported overall number of presentations at scientific conferences
Teaching load	Categories for a respondent’s current teaching load in hours per week: = 0 h per week ≤ 2 h per week ≤ 4 h per week > 4 h per week
Job focus	Focus of the current job/research measured on a 6 digit-scale from 1 (very basic job/research contents) to 6 (very applied or practical job/research contents)
Social support	Three items from the Mentor Role Instrument (MRI) by Ragins and McFarlin (1990) from the perspective of the protégée by Paula B. Schneider (2009); Items are measured on a 6-digit scale from 1 (not at all) to 6 (totally) In my work environment, there are people who ... <ul style="list-style-type: none"> • ...provide support and encouragement, • ... guides my professional development • ... suggests specific strategies for achieving career aspirations
Extraversion	Extraversion assessed by four items of the short version of the Big Five Inventory (BFI-K; Rammstedt and John 2005) measured on a 5-digit scale from 1 (not at all) to 5 (very much) <ul style="list-style-type: none"> • I am outgoing, sociable • I tend to be quiet. (reversed) • I am shy, reserved. (reversed) • I am enthusiastic and motivate people easily
Agreeableness	Agreeableness assessed by four items of the short version of the Big Five Inventory (BFI-K; Rammstedt and John 2005) measured on a 5-digit scale from 1 (not at all) to 5 (very much) <ul style="list-style-type: none"> • I tend to find faults with others. (reversed) • I am sometimes rude to others. (reversed) • I trust people easily and assume best about people • I can be cold and uncaring (reversed)

Table A1 (continued)

Variables	Description
Conscientiousness	<p>Conscientiousness assessed by four items of the short version of the Big Five Inventory (BFI-K; Rammstedt and John 2005) measured on a 5-digit scale from 1 (not at all) to 5 (very much)</p> <ul style="list-style-type: none"> • I am a thorough worker • I am somewhat careless, tend to be lazy. (reversed) • I am efficient and work quickly • I make plans and also carry them out
Neuroticism	<p>Neuroticism assessed by four items of the short version of the Big Five Inventory (BFI-K; Rammstedt and John 2005) measured on a 5-digit scale from 1 (not at all) to 5 (very much)</p> <ul style="list-style-type: none"> • I am nervous • I worry a lot • I tend to feel depressed, blue • I am relaxed, handle stress well. (reversed)
Openness to experiences	<p>Openness to experiences assessed by five items of the short version of the Big Five Inventory (BFI-K; Rammstedt and John 2005) measured on a 5-digit scale from 1 (not at all) to 5 (very much)</p> <ul style="list-style-type: none"> • I have few artistic interests. (reversed) • I am curious about many different things • I am someone who values artistic, aesthetic experiences • I have an active imagination, I am imaginative • I am original, come up with new ideas
Measurement point dummy	Dummy for the measurement point of observation

Table A2 Ordered probit estimation on job satisfaction

	(1)
Working time mismatch (absolute)	−0.025*** (0.003)
Postdocs (1 = yes)	0.030 (0.047)
<i>Socio-demographics</i>	
Age (in years)	0.003 (0.007)
Male (1 = yes)	−0.009 (0.048)
Children (1 = yes)	0.221*** (0.051)
Partner (1 = yes)	−0.037 (0.046)
<i>Job characteristics</i>	
Part-time (1 = yes)	−0.144*** (0.047)
Job focus	0.020 (0.013)
# Conference talks	0.003 (0.002)
<i>Teaching (Base: = 0 h per week)</i>	
≤ 2 h per week	0.080* (0.043)
≤ 4 h per week	0.014 (0.052)
> 4 h per week	0.129** (0.054)
Social support	0.455*** (0.021)
<i>Personality traits</i>	
Extraversion	−0.033 (0.024)
Agreeableness	0.021 (0.023)
Conscientiousness	0.093*** (0.023)
Neuroticism	−0.225*** (0.024)
Openness to experiences	0.039* (0.022)
Measurement point dummies	Yes
Intercept	
Observations	6,058
Pseudo-R ²	0.095

The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***. The variables social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences are standardized

Table A3 Pooled OLS and fixed effects estimations on job satisfaction for part-time and full-time junior academics

	OLS		Fixed effects	
	Part-time	Full-time	Part-time	Full-time
	(1)	(2)	(3)	(4)
Working time mismatch (absolute)	−0.028*** (0.006)	−0.023*** (0.003)	−0.020*** (0.006)	−0.015*** (0.004)
Postdocs (1 = yes)	0.034 (0.105)	0.028 (0.052)	0.137 (0.150)	0.032 (0.085)
<i>Socio-demographics</i>				
Age (in years)	0.212* (0.109)	0.231*** (0.054)	0.538** (0.236)	0.111 (0.083)
Male (1 = yes)	−0.012 (0.014)	0.006 (0.008)		
Children (1 = yes)	0.013 (0.088)	−0.027 (0.055)		
Partner (1 = yes)	0.018 (0.091)	−0.064 (0.054)	0.179 (0.164)	−0.099 (0.081)
<i>Job characteristics</i>				
Job focus	0.052** (0.024)	0.013 (0.015)	0.048 (0.031)	0.007 (0.021)
# Conference talks	0.010 (0.008)	0.002 (0.002)	0.003 (0.017)	−0.004 (0.005)
<i>Teaching (Base: = 0 semester week hours)</i>				
≤ 2 h per week	0.060 (0.085)	0.089* (0.050)	−0.019 (0.091)	0.049 (0.059)
≤ 4 h per week	0.042 (0.108)	0.010 (0.058)	0.041 (0.120)	0.018 (0.060)
> 4 h per week	0.021 (0.108)	0.157** (0.063)	0.014 (0.168)	0.082 (0.068)
Social support	0.531*** (0.036)	0.445*** (0.024)	0.277*** (0.051)	0.256*** (0.029)
<i>Personality traits</i>				
Extraversion	−0.062 (0.045)	−0.033 (0.027)		
Agreeableness	0.008 (0.039)	0.022 (0.026)		
Conscientiousness	0.124*** (0.041)	0.071*** (0.027)		
Neuroticism	−0.188*** (0.045)	−0.245*** (0.027)		
Openness to experiences	0.053 (0.042)	0.030 (0.025)		
Measurement point dummies	Yes	Yes	Yes	Yes
Intercept	2.675*** (0.626)	3.172*** (0.370)	3.162*** (0.234)	3.916*** (0.154)

Table A3 (continued)

	OLS		Fixed effects	
	Part-time	Full-time	Part-time	Full-time
	(1)	(2)	(3)	(4)
Observations	1691	4367	1691	4367
R ^{2(a)}	0.257	0.252	0.078	0.060

The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***

The variables social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences are standardized

(a) We report the adjusted R² for pooled OLS estimations, and the overall R² for the fixed effects estimations

Table A4 Re-estimation of models (3) and (4) in Table 2 accounting for statistical outliers and doctorate status changes

	Outliers		Doctorate status changes	
	Pooled OLS	Fixed effects	Pooled OLS	Fixed effects
	(1)	(2)	(3)	(4)
Working time mismatch (absolute, in hours)	−0.026*** (0.003)	−0.018*** (0.004)	−0.024*** (0.003)	−0.015*** (0.003)
Postdoc (1 = yes)	0.017 (0.047)	−0.000 (0.069)	0.009 (0.049)	−0.019 (0.084)
Controls	Yes	Yes	Yes	Yes
Measurement points dummies	Yes	Yes	Yes	Yes
Intercept	2.960*** (0.324)	3.736*** (0.135)	2.879*** (0.327)	3.752*** (0.136)
# Individuals		1,911		1,949
Observations	5876	5876	5872	5872
R ² (a)	0.256	0.190	0.257	0.192

The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***

Controls: part-time, age, male, children, partner, job focus, # conference talks, teaching, social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences

(a)The adjusted R² is reported for pooled OLS estimations, and the overall R² for the fixed effects estimations

Table A5 Re-estimation of models (3) and (4) in Table 2 with actual working hours as dependent variable

	Pooled OLS	Fixed effects
	(1)	(2)
Actual working hours	−0.010*** (0.003)	−0.003 (0.004)
Postdoc (1 = yes)	0.051 (0.047)	0.023 (0.069)
Controls	Yes	Yes
Measurement point dummies	Yes	Yes
Intercept	3.292*** (0.340)	3.699*** (0.250)
# Individuals	1949	1949
Observations	6058	6058
R ² (a)	0.242	0.173

The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***

Controls: part-time, age, male, children, partner, job focus, # conference talks, teaching, social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences

(a)The adjusted R² is reported for pooled OLS estimations, and the overall R² for the fixed effects estimations

Table A6 Re-estimation of models (3) and (4) in Table 2 with various facets of satisfaction

	Satisfaction with private life		Satisfaction with the opportunities to allocate the working time freely		Satisfaction with the opportunities to take leisure time		Satisfaction with the opportunities to take time for family and partner	
	OLS (1)	Fixed effects (2)	OLS (3)	Fixed effects (4)	OLS (5)	Fixed effects (6)	OLS (7)	Fixed effects (8)
Working time mismatch (absolute)	-0.026*** (0.003)	-0.011*** (0.003)	-0.029*** (0.003)	-0.015*** (0.004)	-0.072*** (0.005)	-0.030*** (0.005)	-0.073*** (0.005)	-0.034*** (0.004)
Postdoc (1=yes)	-0.005 (0.054)	0.278*** (0.068)	0.163*** (0.058)	-0.020 (0.074)	0.171** (0.072)	0.389*** (0.093)	0.116 (0.071)	0.433*** (0.091)
Part-time (1=yes)	-0.020 (0.049)	-0.057 (0.064)	0.185*** (0.054)	0.019 (0.082)	-0.048 (0.066)	-0.067 (0.096)	-0.010 (0.066)	0.044 (0.095)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Measurement point dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	4.078*** (0.385)	3.090*** (0.155)	5.679*** (0.367)	5.014*** (0.145)	6.203*** (0.455)	3.893*** (0.172)	5.773*** (0.462)	3.441*** (0.163)
# Individuals		1,626		1,925		1,925		1,925
Observations	4634	4634	5252	5252	5252	5252	5252	5252
R ^{2(a)}	0.246	0.174	0.088	0.059	0.154	0.065	0.158	0.054

The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***. Controls: age, male, children, partner, job focus, # conference talks, teaching, social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences

^(a)The adjusted R² is reported for pooled OLS estimations, and the overall R² for the fixed effects estimations

Table A7 Arellano-Bond estimations on job satisfaction

	Mismatch ≥ 0			Mismatch ≤ 0			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Job satisfaction _{t-1}	0.192*** (0.053)	0.192*** (0.053)	0.192*** (0.053)	0.209*** (0.055)	0.209*** (0.055)	-0.091 (0.121)	-0.086 (0.118)
Working time mismatch (absolute)	-0.017*** (0.005)	-0.016*** (0.006)	-0.016*** (0.005)	-0.016*** (0.006)	-0.018*** (0.005)	-0.012 (0.013)	-0.001 (0.012)
Postdoc (1 = yes)	0.066 (0.130)	0.075 (0.158)	0.065 (0.130)	0.062 (0.159)	0.035 (0.133)	0.172 (0.314)	0.221 (0.288)
Part-time (1 = yes)	-0.280** (0.129)	-0.280** (0.129)	-0.263* (0.147)	-0.310** (0.137)	-0.323** (0.153)	-0.443*** (0.161)	-0.410*** (0.178)
Working time mismatch * postdoc		-0.001 (0.008)		-0.004 (0.008)		0.015 (0.018)	
Working time mismatch * part-time			-0.002 (0.009)		0.002 (0.009)		-0.011 (0.015)
Intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Measurement point dummies							
Intercept	Yes	Yes	Yes	Yes	Yes ^a	Yes	Yes ^a
	2.818*** (0.371)	2.813*** (0.381)	2.814*** (0.372)	2.739*** (0.392)	2.669*** (0.385)	5.185*** (0.874)	4.702*** (0.897)
# Individuals	812	812	812	795	795	208	208
Observations	2010	2010	2010	1943	1943	345	345

The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***. Controls: age, male, children, partner, job focus, # conference talks, teaching, social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences

^aDummy measurement point 8 dropped because of collinearity

Table A8 OLS and individual fixed effects estimations on job satisfaction (measuring job satisfaction with 3 items)

	OLS		Fixed effects	
	(1)	(2)	(3)	(4)
Working time mismatch (absolute)	-0.008*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.006*** (0.002)
Postdocs (1 = yes)	0.218*** (0.028)	0.128*** (0.027)	0.125*** (0.026)	0.067 (0.049)
<i>Socio-demographics</i>				
Age (in years)	-0.003 (0.004)	0.001 (0.004)	0.001 (0.004)	
Male (1 = yes)	-0.004 (0.024)	-0.022 (0.023)	-0.048* (0.025)	
Children (1 = yes)	0.092*** (0.029)	0.092*** (0.027)	0.091*** (0.027)	0.104 (0.069)
Partner (1 = yes)	-0.022 (0.027)	-0.009 (0.025)	-0.006 (0.025)	0.037 (0.045)
<i>Job characteristics</i>				
Part-time (1 = yes)		-0.102*** (0.025)	-0.100*** (0.025)	-0.069 (0.055)
Job focus		0.004 (0.007)	0.005 (0.007)	0.011 (0.011)
# Conference talks		0.002* (0.001)	0.002 (0.001)	0.004 (0.004)
<i>Teaching (Base: = 0 h per week)</i>				
≤ 2 h per week		0.024 (0.023)	0.028 (0.023)	0.012 (0.031)
≤ 4 h per week		-0.013 (0.029)	-0.006 (0.029)	0.004 (0.038)
> 4 h per week		0.019 (0.030)	0.020 (0.030)	0.020 (0.042)
Social support		0.170*** (0.011)	0.165*** (0.011)	0.111*** (0.017)
<i>Personality traits</i>				
Extraversion			-0.016 (0.012)	
Agreeableness			0.000 (0.011)	
Conscientiousness			0.013 (0.011)	
Neuroticism			-0.053*** (0.012)	
Openness to experiences			0.028** (0.011)	
Measurement point dummies	Yes	Yes	Yes	Yes
Intercept	4.004*** (0.114)	3.393*** (0.119)	3.432*** (0.161)	3.537*** (0.081)
# Individuals	1949	1949	1949	1949
Observations	6058	6058	6058	6058
R ² (a)	0.125	0.189	0.195	0.184

The table reports coefficients and robust standard errors clustered at individual level (in parentheses); Significant results at the 10%, 5% and 1% levels are indicated by *, **, and ***

The variables social support, extraversion, agreeableness, conscientiousness, neuroticism, openness to experiences are standardized

(a) We report the adjusted R² for pooled OLS estimations, and the overall R² for the fixed effects estimations

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impact on study design, on the collection, analysis, or interpretation of the data, or on the writing of the manuscript.

Author contributions The idea for the article, the literature review and the data analysis were performed by IF. The first draft of the manuscript was written by IF and the co-author CG commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Availability of data and material The data is not publicly accessible. We invite researchers interested in the data to approach us.

Code availability The data analysis was conducted using Stata 13. Stata Do-Files are available from the authors upon request.

Declarations

Conflict of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

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