



Article

Mismatched, but Not Aware of It? How Subjective and Objective Skill Mismatch Affects Employee Job Satisfaction

Stephan Bischof

Department Educational Decisions and Processes, Migration, Returns to Education, Leibniz Institute for Educational Trajectories, 96047 Bamberg, Germany; stephan.bischof@lifbi.de

Abstract: Several studies suggest that skill mismatch reduces job satisfaction. To date, research has primarily investigated the impact of subjective skill mismatch; the impact of objective skill mismatch has less commonly been analysed and has generally only focused on mismatches in single skills. The present study addresses the question of whether both subjective and objective skill mismatch reduces employee job satisfaction. This article contributes to previous research by disentangling the effects of objective and subjective skill mismatch on job satisfaction based on a multidimensional measure of objective skill mismatch among employees in Germany. Based on the 2018 wave of the German National Educational Panel Study (NEPS) Adult Cohort, multiple linear regression models are herein estimated in order to investigate how subjective and objective skill mismatches affect people's job satisfaction. The findings indicate that subjectively skill mismatched employees are less satisfied with their job than matched employees to a statistically significant degree, even when controlling for the objective mismatch. However, objectively skill mismatched employees do not show statistically significant lower job satisfaction compared to matched employees. Although there is considerable dissonance between objective mismatches and the subjective perception of being mismatched, the findings suggest that skill mismatch only reduces job satisfaction when employees perceive themselves to be mismatched.

Keywords: skill mismatch; educational mismatch; job satisfaction; objective mismatch; subjective mismatch; multidimensional measure; job attitudes; Germany; NEPS; labour market



Citation: Bischof, Stephan. 2021. Mismatched, but Not Aware of It? How Subjective and Objective Skill Mismatch Affects Employee Job Satisfaction. *Social Sciences* 10: 389. <https://doi.org/10.3390/socsci10100389>

Academic Editors:

Queralt Capsada-Munsech and Tor Eriksson

Received: 28 June 2021

Accepted: 8 October 2021

Published: 14 October 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Skill mismatch is a challenging issue in the labour market, affecting individuals, companies and societies (Bilan et al. 2020; McGuinness et al. 2018; Nikolov et al. 2018); it is still gaining in importance given already existing and advancing megatrends such as technological innovation, globalisation, and demographic change (Comyn and Strietska-Iliina 2019; International Labour Organization 2015; Pauceanu et al. 2020). Especially for individuals, skill mismatch causes manifold negative consequences. To date, skill mismatch research has mainly focused on the individual monetary consequences of skill mismatch such as lower wages (e.g., Brunello and Wruuck 2019); skill mismatch may also harm non-monetary returns such as job satisfaction (e.g., McGuinness et al. 2018). Low job satisfaction itself is also claimed to cause a range of negative consequences. For example, there is evidence that job dissatisfaction is associated with lower productivity of employees (Shobe 2018), higher absenteeism from work (Cohen and Golan 2007; Goldberg and Waldman 2000; Spector 1997) and a higher probability of quitting one's job (Clark et al. 1998; Cornelißen 2009; Green 2010; Kristensen and Westergaard-Nielsen 2004), and is also harmful for workplace integration of foreign employees (Cseh Papp et al. 2018). To counter job dissatisfaction and its potential consequences, it is important to take a closer look at the association between job satisfaction and a possible determinant, skill mismatch.

Skill mismatch describes a situation in the labour market in which the actual skills of employees do not match the skills required for their job (International Labour Office

2018). This distinguishes the skill mismatch concept from other mismatch concepts such as qualification mismatch or educational mismatch that are often used synonymously in the literature, which define mismatch in terms of formal education levels instead of the level of skills. Skill mismatch is typically investigated as either a vertical or horizontal phenomenon. Vertical skill mismatch differentiates in terms of levels of skills, and occurs when an individual's level of skills is lower or higher than the level of skills required to perform their job (Cedefop 2010), distinguishing between underskilled and overskilled among the skill mismatched individuals. By contrast, horizontal skill mismatch differentiates in terms of the type of skills, and occurs when an individual's type of skills does not match the type of skills required to perform their job (Cedefop 2010), merely distinguishing between skill matched and skill mismatched individuals without indicating the direction of mismatch.

The skill mismatch literature also distinguishes between subjective and objective measures. Measures of subjective skill mismatch are based on self-assessments by employees, whereas measures of objective skill mismatch build on objective information, typically competency tests or job analyses (Cedefop 2010). This study uses a measure of subjective skill mismatch, combining characteristics of both vertical and horizontal skill mismatch while not allowing a distinction regarding the direction of mismatch, only distinguishing between employees whose skills match or do not match the requirements of their job, as well as a measure of objective skill mismatch covering the vertical dimension of skill mismatch, distinguishing between underskilled, matched, or overskilled employees.

Research to date has mainly focused on the vertical dimension of skill mismatch, addressing the relation of skill mismatch and job satisfaction in the manner of subjective, self-reported measures of mismatch. Several cross-sectional studies show that any type of subjective skill mismatch is associated with reduced job satisfaction (e.g., Allen and van der Velden (2001) for tertiary education graduates in the Netherlands; Béduwé and Giret (2011) for young professionals in France; Mateos-Romero and del Mar Mateos-Romero and Salinas-Jiménez (2018) for 17 OECD countries; Shevchuk et al. (2019) for Britain). García-Aracil and van der Velden (2008) confirm these findings merely for overskilled employees, whereas being underskilled is associated with increased job satisfaction. Moreover, Van der Velden and Verhaest (2017) show that being overskilled at the start of the job is associated with less job satisfaction. However, in the case of being underskilled, this only applies to those who are highly underskilled at the start of their job. Some panel studies, differentiating merely between being overskilled and skill matched, show that subjective overskilling harms employee job satisfaction (Vieira (2005) for Portugal; Congregado et al. (2016) for the EU-15 countries). Other studies show that subjective skill mismatch has negative consequences for job satisfaction and that skill mismatches are much better predictors of job satisfaction than educational mismatches (e.g., Green and Zhu (2010) cross-sectional study for Great Britain; Badillo-Amador et al. (2012) panel study for Spain; Mavromaras et al. (2012) panel study for Australia; Mavromaras et al. (2013) panel study for Australia). In sum, empirical evidence about the consequences of subjective skill mismatch shows a fairly consistent picture, whereby subjective skill mismatch and especially subjective overskilling seem to reduce employee job satisfaction.

Surprisingly, only a few studies to date have analysed the impact of objective skill mismatch on job satisfaction. The first cross-sectional studies provide very important insights. For example, Allen et al. (2013) analyse the impact of objective skill mismatch in literacy and numeracy, using the first wave of PIAAC among 22 countries. For literacy, they show that being overskilled reduces job satisfaction, while being underskilled increases it. However, they find no significant relation between being mismatched in numeracy and job satisfaction. Bönisch et al. (2019) also use data from the first wave of PIAAC, focusing on Austria, Germany, Spain, Flanders, England and Northern Ireland. They show that being overskilled in literacy significantly reduces job satisfaction in Flanders, but not in other countries. Further, there are no significant results for skill mismatch in numeracy in any country. Fregin et al. (2018) are the first to compare subjective and objective measures of skill mismatch and their relation to job satisfaction. Using the first wave of PIAAC

among 22 countries and focusing on male employees in full-time jobs, they show that only subjectively perceived skill mismatch (overskilled and underskilled) harms job satisfaction. Since there is no significant relation between objective skill mismatch in numeracy and job satisfaction, the authors conclude that the negative correlation between skill mismatch and job satisfaction is an artefact caused by subjective measures that does not hold for the more reliable objective measures (Fregin et al. 2018).

In sum, previous research about objective skill mismatch and job satisfaction shows different results for mismatches in different skills. However, all of these studies operationalise objective skill mismatch based on single skill dimensions, like literacy or numeracy. This is associated with the methodological problem that people are already classified as skill mismatched if they do not match the required skill level in a single skill (e.g., literacy or numeracy). Moreover, one-dimensional skill mismatch measures only refer to mismatches in a single skill domain, whereas people might rather consider a whole bundle of skills instead of a single skill domain in their subjective self-assessment. This complicates the comparability between subjective and objective skill mismatch measures, since subjective measures refer to multiple skill dimensions while previously-used objective measures are only one-dimensional. Multidimensional measurement of skill mismatch might address this methodological problem due to its coverage of a range of skills domains. The present study therefore tackles the research question of whether both subjective skill mismatch and multidimensional objective skill mismatch reduce employee job satisfaction.

Following the idea of Fregin et al. (2018), this article aims to offer further insights into the relationship between subjective and objective skill mismatch and job satisfaction, adding to the previous literature in four ways. First, a multidimensional measure of objective skill mismatch is introduced based on mismatches in five skill domains (reading, mathematical, ICT, scientific and cognitive basic literacy). The multidimensional measure of skill mismatch covers domains of basic skills that are relevant across a variety of occupations and hold strong relevance in the modern information society's world of work (Cedefop 2018; Cedefop and Eurofound 2018; OECD 2019; Weinert et al. 2019). By using a multidimensional mismatch measure, it is intended to place the concept of objective skill mismatch on a broader foundation and tackle its susceptibility to erroneous classifications based on individual skills. Second, this study analyses for the first time whether multidimensional objective skill mismatch is associated with employee job satisfaction. In this context, the multidimensional skill mismatch measure may provide new evidence concerning whether the previously postulated results on the relationship between objective skill mismatch and job satisfaction are merely artefacts due to the one-dimensional measures that are only valid for individual skill domains. Third, this article investigates the association between objective skill mismatch and subjective skill mismatch. In order to meaningfully interpret the potential impact of subjective and objective skill mismatch on affective perceptions such as job satisfaction, it is necessary to analyse whether and to what extent people's subjective assessments correspond to objective circumstances. Finally, by disentangling the separate impact directly caused by the two types of skill mismatch on people's job satisfaction, this article aims to clarify whether both objective and subjective skill mismatch are directly related to workers' job satisfaction.

2. Theory and Hypotheses

2.1. The Impact of Skill Mismatch on Job Satisfaction

There are various theories assuming a negative impact of skill mismatches on people's job satisfaction. According to the theory of person–environment fit (Edwards 1991, 1996; French et al. 1982), people's attitudes toward jobs depend on the fit between themselves and their job, e.g., concerning how their skills match the job demands. Jobs that do not fit workers since they are too complex or too simple compared to their skills can be expected to cause negative job attitudes such as lower job satisfaction (French et al. 1982). Therefore, both underskilled and overskilled employees might be less satisfied with their jobs compared to employees who fit well to their jobs. The flow theory

(Csikszentmihalyi 1975, 1990) assumes that people enjoy activities if their requirements are neither too high nor too low for them. If the challenges of an activity are just balanced with their skills, people enter into a state of flow (Csikszentmihalyi 1990). However, challenges that are understraining or overstraining for people's skills do not cause a state of flow. Transferred to the world of work, matched employees might enter into a state of flow since the challenges of their jobs match their skills, which makes them more likely to enjoy their jobs. By contrast, underskilled employees might assess their jobs as too complex, which might lead to worries or even anxiety, and overskilled employees might be bored as they may not make use of all their skills and may perceive their jobs as less challenging (Csikszentmihalyi 1975). Therefore, underskilled or overskilled employees might be less likely to enjoy their jobs compared to matched employees. People's level of satisfaction might also be affected by unrealised expectations or a strong discrepancy between their aspirations and reality (Campbell et al. 1976). The more strongly their achievements deviate from their aspirations, the lower their level of satisfaction. This might also be true for aspirations in working life; particularly, working in a job with a level of demand below one's level of proficiency can be expected to cause unrealised expectations for individuals (World Economic Forum 2014), since overskilled employees might expect to perform more challenging and interesting work (Congregado et al. 2016). Conversely, underskilling might reduce people's job satisfaction by causing strain or being a hindrance in their job, which might harm their job satisfaction (Van Oortmerssen et al. 2020). Thus, skill mismatch is expected to reduce job satisfaction, regardless of whether individuals are underskilled or overskilled.

However, the impact of skill mismatch on people's job satisfaction might differ depending on whether it is an objective skill mismatch or a subjectively perceived skill mismatch. On the one hand, an objective match or mismatch might not necessarily be subjectively perceived as such. For example, French et al. (1982) show that while there might be both subjective and objective mismatches between jobs and people, it is mainly the subjective mismatches which cause strain. Accordingly, employees might be objectively mismatched for their job but might not be aware of it, or their skills might match their job requirements but they might perceive themselves as mismatched. On the other hand, subjective and objective mismatch might also be considered as overlapping constructs (Maltarich et al. 2011), assuming that subjective mismatches are caused by objective mismatches (Feldman et al. 2002; García-Mainar and Montuenga-Gómez 2020; Liu and Wang 2012; Maltarich et al. 2011; McKee-Ryan et al. 2009).

This article follows the assumption that objectively mismatched individuals tend to perceive themselves subjectively as mismatched, and vice versa. Moreover, the theoretical explanations suggest that skill mismatch is associated with lower job satisfaction. In line with the assumption of a link between objective and subjective skill mismatch, it is assumed that both objective and subjective mismatch harm people's job satisfaction. The following two hypotheses are derived:

Hypothesis 1 (H1). *Subjectively skill mismatched employees show less job satisfaction compared to subjectively skill matched employees.*

Hypothesis 2 (H2). *Objectively skill mismatched (underskilled or overskilled) employees show less job satisfaction compared to objectively skill matched employees.*

2.2. The Direct Impact of Subjective Skill Mismatch on Job Satisfaction

How people evaluate situations and the emotional reactions they show concerning a given situation primarily depend on how the situation is subjectively evaluated (Smith and Lazarus 1990). Therefore, the individual evaluation or emotional reaction to one's work situation might also primarily depend on how this situation is subjectively perceived. Csikszentmihalyi (1990) assumes that it is not only the actual mismatch between individuals and their jobs as such that determines how people feel and judge their situation, but rather whether they are aware of it. Thus, workers might feel, for example, overworked, bored, or

complain about unrealized expectations due to subjective perceptions of being mismatched for their job, which might, in turn, harm their job satisfaction. The subjective perception of being mismatched might thus have a direct negative impact on people's job satisfaction, regardless of whether this individual is objectively mismatched or not. Hence, the third hypothesis is derived:

Hypothesis 3 (H3). *Subjectively skill mismatched employees show less job satisfaction compared to subjectively skill matched employees even when controlling for objective skill mismatch.*

2.3. The Direct Impact of Objective Skill Mismatch on Job Satisfaction

Given the assumption that objective skill mismatches are likely to affect the people concerned in the performance of their jobs, objective mismatches might have a direct impact on people's job satisfaction. Regardless of whether or not people perceive that they are mismatched, objectively skill mismatched employees might be more likely to have complications in their daily work routine compared to objectively skill matched employees, since they are either unable to deal with the requirements of their jobs (underskilled) or they cannot make use of all their skills (overskilled) in their jobs. By contrast, objectively skill matched employees might be more likely to cope with the demands of their jobs and deploy their skills on the job. Matched employees are therefore more likely to be saved from inconveniences at work and provided with a feeling of success associated with their jobs, which in turn might have a positive impact on their job satisfaction. These circumstances do not depend on subjective perceptions of mismatch, but they might be directly caused by the unfavourable working conditions of skill mismatched workers. Objective mismatches might therefore constitute objective stressors for the persons concerned, which might have a negative impact on the evaluation of the job situation, irrespective of whether a mismatch is subjectively perceived or not. For this reason, objective mismatches are assumed to harm job satisfaction irrespective of whether or not people perceive themselves as mismatched. Therefore, the fourth hypothesis is derived as follows:

Hypothesis 4 (H4). *Objectively skill mismatched (underskilled or overskilled) employees show less job satisfaction compared to objectively skill matched employees even when controlling for subjective skill mismatch.*

3. Data and Methods

3.1. Data

The following analyses are based on the German National Educational Panel Study (NEPS) Adult Cohort Version 11.1.0, Blossfeld et al. (2011). The total sample of respondents in the NEPS Adult Cohort, starting in 2007 (wave 1), consisted of adults living in Germany born between 1944 and 1986 (Blossfeld and Roßbach 2019). The NEPS Adult Cohort provides extensive socio-demographic data and rich information on the educational and employment biography of the respondents from different waves. This paper draws on a cross-section design of the 2018 wave, the 11th wave of the NEPS Adult Cohort, since panel observations were not available for the treatment variables used. In addition to the cross-section information from wave 11, variables from previous waves of the panel data were also used if the relevant information was not collected in wave 2018 but in one of the previous waves; this primarily concerns the competency tests in the five different skills of the objective skill mismatch indicator and two personality traits, conscientiousness and neuroticism, which were assumed to remain constant over time.¹

The NEPS Adult Cohort provided some important advantages for the sake of analysing the impact of subjective and objective skill mismatch on people's job satisfaction. By covering objective information on the competencies of employed adults in five different skill domains relevant for labour market success, it offered the opportunity to construct a multidimensional skill mismatch measure reflecting the coverage of a broader range of skill domains relevant to the labour market among adults compared to other studies, such

as the PIAAC. In addition, the NEPS Adult Cohort provided subjective assessments of how employed people subjectively assess their own fit in their job. Thus, the NEPS Adult Cohort provided the opportunity to compare objective multidimensional skill mismatches with subjective skill mismatches and analyse the consequences among employed adults.

3.2. Sample

The analysis sample was based on people who participated in the 2018 wave of the NEPS Adult Cohort. In order to construct a multidimensional skill mismatch measure, all people who were missing values in any of the five skills of the objective skill mismatch indicator were excluded from the sample. Employees whose occupational groups could not be assigned to the ISCO-08 were also excluded, since the information about people's occupational group membership was necessary in order to operationalise the objective skill mismatch indicator. Further, the sample was restricted to adults with a maximum age of 65 years who at the time of their interview in the 2018 wave were employed for at least 15 h per week, excluding the self-employed, persons with pre-employment activities, freelancers, family workers, people employed in the secondary labour market or seasonal work, and people with missing values in any of the required variables. The final sample was unweighted and relied on 3116 respondents.

3.3. Measurements

The dependent variable of job satisfaction was based on an 11-point scale asking respondents how satisfied they are with their work, ranging from "completely dissatisfied" to "completely satisfied".

The first independent variable of subjective skill mismatch was based on the statement that "The requirements of the job match my skills", offering a five-point scale to respondents ranging from "completely disagree" to "completely agree". This indicator might capture both mismatches in the type of skills or mismatches in the level of skills, but does not allow for differentiation among mismatched employees as underskilled or overskilled, merely between skill matched and skill mismatched employees. Therefore, this study used a dichotomised subjective skill mismatch indicator (skill match as opposed to skill mismatch) where those who completely or somewhat agreed with the statement were predicted as subjectively skill matched, and those who partly agreed, somewhat disagreed, or completely disagreed were predicted as subjectively skill mismatched.

The second independent variable of objective skill mismatch was operationalised based on a multidimensional concept taking into account mismatches in five different skills. For this reason, five single objective skill mismatch indicators were calculated for each individual in reading, mathematical, ICT, scientific and cognitive basic literacy. Each of the five objective skill mismatch indicators were based on a comparison of the level of skills required per occupational group and the level of skills of the individuals. The reference group for the calculation of skill requirements was based on persons up to the age of 65 who were employed for at least 15 h per week, excluding the self-employed, persons with pre-employment activities, freelancers, and family workers who subjectively evaluated that the requirements of their job matched their skills.² For each skill domain, the required levels of skills were defined as the average proficiency level of people working in the same ISCO-08 two-digit occupational sub-major group, plus and minus one standard deviation.³ Employees were classified as underskilled or overskilled in the specific skills if their proficiency level was more than one standard deviation below or above the required level in their occupational group. If the skill level of an employee was in between the range of averaged skill levels plus and minus one standard deviation, the person was classified as matched. Thus, every person in the sample was classified as underskilled, matched or overskilled in all of the five skills. The multidimensional skill mismatch measure was generated based on the five different skill mismatch indicators. If employees were rated as underskilled in the majority, i.e., at least three out of five of the single skill mismatch indicators, they were classified as underskilled in the multidimensional

measure. Employees were rated as overskilled in the multidimensional measure if they were overskilled in the majority of the five skill mismatch indicators. People who were matched in the majority of the skills or who were not underskilled in at least three out of five skills or not overskilled in at least three out of five skills were considered matched.

Further, the analyses herein draw on control variables that are likely to condition both the independent variables of subjective skill mismatch and objective skill mismatch and the dependent variable of job satisfaction. Table 1 provides an overview of the descriptive sample statistics, including all variables used in the study.

Table 1. Descriptive sample statistics.

Variables	Mean	SD	Min	Max
dependent variable				
job satisfaction	7.23	1.67	0	10
independent variables				
subjective skill mismatch	0.20	0.40	0	1
objective skill mismatch				
underskilled	0.09	0.28	0	1
matched	0.83	0.37	0	1
overskilled	0.08	0.27	0	1
control variables				
male	0.50	0.50	0	1
age	51.37	8.27	32	65
immigration background	0.15	0.35	0	1
highest educational attainment				
unskilled/no apprenticeship	0.02	0.15	0	1
Hauptschule w. apprenticeship	0.11	0.32	0	1
sec. school w. apprenticeship	0.32	0.47	0	1
A level without tertiary degree	0.19	0.39	0	1
tertiary degree	0.35	0.48	0	1
duration in the job	156.02	127.15	0	553
occupational area				
agriculture, forestry, etc.	0.00	0.06	0	1
production of raw materials, etc.	0.16	0.37	0	1
construction, architecture, etc.	0.05	0.21	0	1
natural sciences, informatics, etc.	0.06	0.24	0	1
traffic, logistics, etc.	0.08	0.26	0	1
commercial services, sales, etc.	0.09	0.28	0	1
business organisation, law, etc.	0.27	0.44	0	1
social sector, teaching, etc.	0.26	0.44	0	1
humanities, economics, etc.	0.03	0.18	0	1
occupational requirement level				
unskilled or semi-skilled	0.05	0.22	0	1
specialist	0.47	0.50	0	1
complex specialist	0.17	0.37	0	1
highly complex	0.32	0.47	0	1
part-time job	0.33	0.47	0	1
workplace in East Germany	0.19	0.39	0	1
educational mismatch				
undereducated	0.23	0.42	0	1
matched	0.55	0.50	0	1
overeducated	0.22	0.42	0	1
conscientiousness	3.95	0.67	1.5	5
neuroticism	2.62	0.75	1	5

N = 3116.

3.4. Analytical Strategy

The analysis began by examining the extent to which subjective and objective skill mismatches were related, drawing on bivariate distributions.

Subsequently, the hypotheses of whether and how subjective and objective skill mismatch affect people's job satisfaction were tested using multivariate linear regression models. Given the cross-sectional design, this paper draws on OLS regressions. Three models were estimated to test the hypotheses. The first two models analysed the impact of subjective to objective skill mismatch, respectively, on people's job satisfaction. Both models drew on controls that conditioned both the respective independent variable (subjective skill mismatch in model 1; objective skill mismatch in model 2) and the dependent variable (job satisfaction) in order to prevent confounding bias in the effect of skill mismatch (Elwert and Winship 2014). The third model tested the separate effects of subjective skill mismatch and objective skill mismatch on job satisfaction. This model included subjective skill mismatch and objective skill mismatch in addition to the control variables, in order to determine the separate effects of both types of skill mismatch while controlling for the other one.

4. Findings

4.1. Bivariate Findings

The descriptive sample statistics show a discrepancy between the proportion of workers who subjectively perceive themselves as mismatched and the proportion of objectively mismatched employees (Table 1). Around 20 per cent of employees subjectively assess themselves as skill mismatched, whereas only around 17 per cent of employees are objectively considered to be mismatched (around nine per cent underskilled; around eight per cent overskilled). Table 2 shows how people with an objective skill match or skill mismatch classify themselves subjectively.

Table 2. Bivariate relation between objective and subjective skill mismatch.

Objective Skill Mismatch	Subjective Skill Mismatch	
	Matched	Mismatched
matched	80.02%	19.98%
mismatched	78.01%	21.99%
underskilled	75.65%	24.35%
overskilled	80.56%	19.44%

N = 3116.

As can be seen, 80.02 per cent out of all workers who objectively possess the required level of skills classify themselves subjectively as matched, whereas 19.98 per cent of them perceive themselves to be mismatched. However, out of all workers who are objectively skill mismatched, only 21.99 per cent subjectively classify themselves as mismatched. By contrast, 78.01 per cent out of all objectively skill mismatched workers do not subjectively classify themselves as mismatched but rather as matched. This means that the vast majority of objectively mismatched employees are either not aware of their mismatched situation or they irrespectively assume that their skills match the requirements of their job. These dissonances between objective mismatch and subjective perception of mismatch are slightly more common among objectively overskilled workers—where 80.56 per cent assess themselves as matched—compared to objectively underskilled workers, where 75.65 per cent assess themselves as matched. Table 3 provides an overview of how people who assess themselves as mismatched or matched are classified in terms of objective skill mismatch.

Out of all workers who subjectively classify themselves as matched, 83.57 per cent are objectively matched. However, of all those who subjectively classify themselves as mismatched, 81.83 per cent objectively do have the required level of skills for their job. Thus, the vast majority of employees who subjectively classify themselves as skill mismatched actually objectively possess the required skills.

Table 3. Bivariate relation between subjective and objective skill mismatch.

Subjective Skill Mismatch	Objective Skill Mismatch			
	Matched	Mismatched	Underskilled	Overskilled
matched	83.57%	16.43%	8.26%	8.18%
mismatched	81.83%	18.17%	10.43%	7.74%

N = 3116.

These findings indicate considerable differences between the objective circumstances and the subjective self-assessments of workers and contradict the assumption of a strong correlation between objective mismatch and subjective mismatch perception. The majority of those who are objectively mismatched perceive themselves to be matched, and the majority of those who subjectively perceive themselves to be mismatched objectively in fact possess the required level of skills. Whether one's skills actually match the requirements of the job or not therefore seems to hold only minor relevance to people's subjective perception of being matched or mismatched.

4.2. Regression Analyses

Table 4 presents the findings of the three models estimated in order to test the hypotheses.

Table 4. Multiple linear regression analyses regarding skill mismatch and job satisfaction.

	Model 1		Model 2		Model 3	
	Coef.	SE	Coef.	SE	Coef.	SE
Subjective skill mismatch (ref. matched)	−1.01 ***	0.07			−1.00 ***	0.07
Objective skill mismatch (ref. matched)						
underskilled			−0.19	0.11	−0.13	0.11
overskilled			−0.01	0.11	−0.03	0.11
Male (ref. female)	−0.13	0.08	−0.13	0.08	−0.14	0.08
Age	−0.00	0.00	−0.00	0.00	−0.00	0.00
Immigration background (ref. no immigration background)	−0.02	0.08	−0.05	0.08	−0.01	0.08
Educational attainment (ref. sec. school w. appr.)						
unskilled/no appr.	0.38	0.22	0.52 *	0.23	0.39	0.22
Hauptschule w. appr.	0.08	0.14	0.17	0.14	0.08	0.14
A level without tertiary degree	−0.16	0.12	−0.22	0.12	−0.17	0.12
tertiary degree	−0.19	0.13	−0.33 *	0.13	−0.20	0.13
Duration in the job	−0.00 ***	0.00	−0.00 **	0.00	−0.00 ***	0.00
Occupational area (ref. social sector, teaching, etc.)						
agriculture, forestry, etc.	−0.71	0.51	−0.75	0.52	−0.71	0.51
prod. of raw materials, etc.	−0.17	0.10	−0.27 **	0.10	−0.17	0.10
construction, architecture, etc.	0.12	0.15	0.00	0.16	0.12	0.15
natural sciences, etc.	−0.08	0.13	−0.10	0.14	−0.08	0.13
traffic, logistics, etc.	−0.26	0.13	−0.50 ***	0.13	−0.26 *	0.13
commercial services, etc.	−0.05	0.12	−0.14	0.12	−0.06	0.12
business organisation, etc.	−0.06	0.08	−0.10	0.08	−0.06	0.08
humanities, economics, etc.	−0.18	0.17	−0.26	0.18	−0.18	0.17

Table 4. Cont.

	Model 1		Model 2		Model 3	
	Coef.	SE	Coef.	SE	Coef.	SE
Occupational requirement level (ref. unskilled or semi-skilled)						
specialist	−0.05	0.14	0.05	0.15	−0.04	0.14
complex specialist	−0.16	0.16	0.04	0.16	−0.14	0.16
highly complex	0.18	0.18	0.50 **	0.19	0.20	0.18
Part-time job (ref. full-time job)	0.02	0.07	−0.01	0.08	0.02	0.07
Workplace in East Germany (ref. workplace in West Germany)	0.06	0.07	0.04	0.08	0.07	0.08
Educational mismatch (ref. matched)						
undereducated	−0.06	0.11	−0.14	0.12	−0.05	0.11
overeducated	0.31 **	0.12	0.39 **	0.12	0.33 **	0.12
Conscientiousness	0.18 ***	0.04	0.21 ***	0.04	0.19 ***	0.04
Neuroticism	−0.34 ***	0.04	−0.37 ***	0.04	−0.34 ***	0.04
R-squared	0.11		0.06		0.11	

N = 3116; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Data: NEPS Adult Cohort, Version 11.1.0.

Model 1 investigated the effect on job satisfaction of being subjectively skill mismatched. In line with Hypothesis 1, employees who perceive themselves as skill mismatched report statistically significant lower job satisfaction compared to those who are subjectively skill matched. The job satisfaction of employees assessing themselves as subjectively skill mismatched is 1.01 points lower compared to that of employees assessing themselves as skill matched.

Model 2 refers to the association between objective skill mismatch and employee job satisfaction. Compared to objectively skill matched employees, both underskilled and overskilled individuals tend to be less satisfied with their job. However, these results are not statistically significant, and Hypothesis 2 is therefore falsified. Regarding the first two hypotheses, the findings indicate that job satisfaction is only lower to a statistically significant degree for subjectively skill mismatched people, not for objectively skill mismatched people.

Model 3 investigated whether objective and subjective skill mismatch have a direct effect on employees' job satisfaction. Therefore, the separate effect of subjective mismatch on job satisfaction was analysed while controlling for objective mismatch, and the separate effect of objective mismatch on job satisfaction was analysed under the control of subjective mismatch. In accordance with Hypothesis 3, subjectively skill mismatched employees were statistically significantly less satisfied with their job compared to subjectively skill matched employees even when controlling for objective skill mismatch. Compared to Model 1, where subjectively skill mismatched employees had lower job satisfaction by 1.01 points compared to subjectively matched employees, the job satisfaction of subjectively skill mismatched employees was still 1.00 points lower compared to subjectively matched employees in Model 3 when controlling for objective skill mismatch. Thus, even when controlling for objective skill mismatch, the perception of being subjectively skill mismatched has an almost identical negative effect on people's job satisfaction. By contrast, Hypothesis 4 is falsified, since objectively underskilled or overskilled employees do not show statistically significant lower job satisfaction compared to objectively skill matched employees even when controlling for subjective skill mismatch. Thus, there is no direct negative effect of objective skill mismatch on people's job satisfaction.

Overall, the findings indicate that subjectively perceived skill mismatch is relevant for people's job satisfaction, irrespective of whether such a mismatch objectively exists

or not, although there is no direct statistically significant association between objective skill mismatch and people's job satisfaction. These results are essentially in line with the findings of Fregin et al. (2018), who also showed lower job satisfaction only for subjectively perceived skill mismatch, not for objective skill mismatch in numeracy. The present results also confirm these findings for multidimensional objective skill mismatch considering more than one skill dimension. Moreover, the findings show that objective mismatch does not contribute either directly or indirectly to statistically significant lower job satisfaction. The findings on subjective skill mismatch are also in line with previous research postulating a negative relation between subjective skill mismatch and job satisfaction. In addition to previous research, these results also show that the subjective perception of being skill mismatched reduces employee job satisfaction regardless of whether the skill mismatch objectively exists.

One reason for the differing effects of objective and subjective skill mismatches on workers' job satisfaction might be due to the fact that the majority of objectively mismatched people do not subjectively perceive themselves as mismatched. Hence, interaction effects were added to the previous models to test whether objectively and subjectively mismatched employees are less satisfied with their jobs than objectively matched but subjectively mismatched employees (Table A1 in Appendix A). Nonetheless, people who are both objectively mismatched (underskilled or overskilled) and subjectively mismatched do not show statistically significant lower job satisfaction compared to people who are objectively matched and subjectively mismatched. This is another hint that people's job satisfaction is only reduced by skill mismatch if people perceive themselves to be skill mismatched. Whether or not the self-assessment of a skill mismatch corresponds to the objective facts does not seem to have any additional relevance. Thus, subjective feelings rather than objective conditions seem to be most relevant to employee job satisfaction.

4.3. Robustness Checks

In order to rule out the possibility that these results are due to the multidimensional measure of objective skill mismatch, the main models were additionally calculated using unidimensional objective skill mismatch measures, defining objective skill mismatch in terms of the mismatch in the individual skills in reading, mathematics, ICT, scientific literacy and basic cognitive literacy. However, across all five different unidimensional objective skill mismatch measures the results remained essentially the same compared to the results of the models for the multidimensional objective skill mismatch measure (Table A2 in the Appendix A).

Further, to determine whether there are differences between objectively skill matched and objectively skill mismatched employees in general, the models including objective skill mismatch were estimated again, distinguishing only skill matched from skill mismatched (either underskilled or overskilled) employees (Table A3 in the Appendix A). There were also no statistically significant differences between objectively matched and mismatched employees. Accordingly, neither a general objective skill mismatch nor individual manifestations of this mismatch (underskilled or overskilled) have a statistically significant negative effect on job satisfaction.

Moreover, the main models were calculated again without using the control variable of educational mismatch, considered problematic for causal analytical considerations (Table A4 in the Appendix A). Again, there were no statistically significant changes regarding the relevant associations.⁴

5. Discussion and Conclusions

The present study has investigated whether and how subjective and objective skill mismatch affects the job satisfaction of employees in Germany. Using cross-section data from the 2018 wave of the NEPS Adult Cohort, this article shows that subjectively perceived skill mismatch reduces people's job satisfaction to a statistically significant degree, including when controlling for objective mismatches. However, objectively skill mismatched

employees are not less satisfied with their jobs to a statistically significant degree compared to matched employees, neither in general nor when controlling for subjective mismatch. Therefore, job satisfaction is only harmed by skill mismatch if people subjectively perceive it, regardless of whether this skill mismatch actually exists or not. In addition, for people's job satisfaction it holds no additional importance whether the subjective perception of a skill mismatch corresponds to objective reality or not.

The main findings are essentially in line with previous studies suggesting job satisfaction penalties for subjectively skill mismatched employees (e.g., [Allen and van der Velden 2001](#); [Mateos-Romero and Salinas-Jiménez 2018](#)) and with the findings of [Fregin et al. \(2018\)](#), which indicated statistically significant lower job satisfaction only for subjectively perceived skill mismatch, not for objective skill mismatch in numeracy. The present study is the first to confirm these findings for a multidimensional measure of objective skill mismatch. This study also highlights that objective findings of skill mismatch do not coincide with people's subjective perceptions. The majority of objectively skill mismatched employees are not aware of it. Moreover, the majority of subjectively skill mismatched employees are not aware of objectively possessing the required level of skills. These discrepancies between objective circumstances and subjective self-assessment might explain why objective mismatch does not have a statistically significant effect on job satisfaction, since the majority of objectively mismatched employees might not evaluate their job situation as being burdening.

However, this gap between objective circumstances and subjective self-assessments is not necessarily based on misperceptions by workers; it might also be explained by the limitations of objective skill mismatch measures. For example, workers might mismatch the required skill levels in the objectively assessed skill domains but define themselves as matched due to their level of skills in other skill domains such as communication, planning and organisation, problem-solving, or physical skills, or vice versa. Such limitations of objective skill mismatch measures cannot be completely prevented even by a multidimensional skill mismatch measure. The present study comes with further limitations. To analyse the differences between subjective and objective skill mismatch in further detail, subjective skill mismatch should not only be measured based on the horizontal but also the vertical dimension, differentiating between subjectively underskilled and subjectively overskilled employees. Moreover, the analyses herein may be subject to bias due to unobserved confounding variables such as, for example, people's capacity for self-reflection, feedback from their superiors, or workplace atmosphere. Further, the present study does not allow for drawing any conclusions on the relationship between skill mismatch and job satisfaction for younger labour market entrants, due to sample composition in terms of age.

To sum up, the present article derives three main conclusions. First, subjective skill mismatch has a negative effect on workers' job satisfaction even if this mismatch does not objectively exist. Second, objective skill mismatches do not have a statistically significant effect on job satisfaction. Third, there is a considerable discrepancy between objective skill mismatches and subjective feelings of being skill mismatched, and vice versa.

These findings might enable the drawing of valuable conclusions; for example, allowing companies to optimise the job satisfaction of their workforce. Thus, employers who want to increase the job satisfaction of their staff or aim to prevent negative consequences caused by a lack of job satisfaction, such as employee-intended job changes or absenteeism, might consider the subjective perceptions of their staff and take targeted countermeasures in cases of perceived mismatch. However, for policy-making, the findings primarily mean some sobering conclusions, since targeted policy measures that, for example, aim to increase and ensure matching between jobs and individuals do not necessarily improve people's level of job satisfaction.

Subsequent research might build on these findings addressing, for example, the gap between objective and subjective skill mismatch in further detail. Future research might address the causes of discrepancies between subjective perceptions of skill mismatch

and the objectively existing skill mismatch, showing how subjectively skill mismatched people differ from objectively skill mismatched people. Moreover, additional research might investigate whether these contrasts in consequence of subjective and objective skill mismatch are confirmed for other affective work-related outcomes, such as feelings of overload, pressure or work–life conflict, as well as non-affective outcomes like individuals' education and training behaviour. The limitations might also offer opportunities for future research. For example, subsequent research might target young labour market entrants, investigating whether objective mismatches in this group matter for their job satisfaction. The findings of the present study also hint that mismatches between education levels and the level required for their job might affect their job satisfaction. Therefore, future research might also refocus on the facets of educational mismatch and skill mismatch, and their significance for job satisfaction.

Funding: This research received no external funding.

Data Availability Statement: This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort Adults, doi:10.5157/NEPS:SC6:11.1.0. From 2008 to 2013, NEPS data was collected as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). As of 2014, NEPS has been carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network.

Conflicts of Interest: The author declares no conflict of interest.

Appendix A

Table A1. Multiple linear regression analyses regarding skill mismatch and job satisfaction including interaction effects between subjective and objective skill mismatch.

	Model	
	Coef.	SE
Subjective skill mismatch (ref. matched)	−1.00 ***	0.08
Objective skill mismatch (ref. matched)		
underskilled	−0.09	0.12
overskilled	−0.04	0.12
Subj. skill mismatch * obj. skill mismatch (ref. subj. mismatch * obj. matched)		
subj. mismatched * obj. underskilled	−0.15	0.24
subj. mismatched * obj. overskilled	0.10	0.27
Male (ref. female)	−0.14	0.08
Age	−0.00	0.00
Immigration background (ref. no immigration background)	−0.02	0.08
Educational attainment (ref. sec. school w. appr.)		
unskilled/no appr.	0.40	0.22
Hauptschule w. appr.	0.08	0.14
A level without tertiary degree	−0.17	0.12
tertiary degree	−0.21	0.13
Duration in the job	−0.00 ***	0.00

Table A1. Cont.

	Model	
	Coef.	SE
Occupational area (ref. social sector, teaching, etc.)		
agriculture, forestry, etc.	−0.71	0.51
prod. of raw materials, etc.	−0.17	0.10
construction, architecture, etc.	0.12	0.15
natural sciences, etc.	−0.08	0.13
traffic, logistics, etc.	−0.26 *	0.13
commercial services, etc.	−0.06	0.12
business organisation, etc.	−0.06	0.08
humanities, economics, etc.	−0.18	0.17
Occupational requirement level (ref. unskilled or semi-skilled)		
specialist	−0.04	0.14
complex specialist	−0.14	0.16
highly complex	0.21	0.18
Part-time job (ref. full-time job)	0.02	0.07
Workplace in East Germany (ref. workplace in West Germany)	0.07	0.08
Educational mismatch (ref. matched)		
undereducated	−0.06	0.11
overeducated	0.32 **	0.12
Conscientiousness	0.19 ***	0.04
Neuroticism	−0.34 ***	0.04
R-squared	0.11	

N = 3116; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Data: NEPS Adult Cohort, Version 11.1.0.

Table A2. Multiple linear regression analyses regarding skill mismatch and job satisfaction using unidimensional measures for objective skill mismatch.

	Reading Literacy		Mathematical Literacy		ICT Literacy		Scientific Literacy		Cogn. Basic Literacy	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Subjective skill mismatch (ref. matched)	−1.01 ***	0.07	−1.01 ***	0.07	−1.00 ***	0.07	−1.01 ***	0.07	−1.01 ***	0.07
Objective skill mismatch (ref. matched)										
underskilled	0.06	0.08	0.04	0.09	−0.11	0.08	−0.09	0.09	−0.06	0.08
overskilled	0.05	0.08	0.07	0.09	−0.09	0.09	−0.15	0.09	0.05	0.08
Male (ref. female)	−0.13	0.08	−0.13	0.08	−0.13	0.08	−0.12	0.08	−0.13	0.08
Age	−0.00	0.00	−0.00	0.00	−0.00	0.00	−0.00	0.00	−0.00	0.00
Immigration background (ref. no immigration background)	−0.02	0.08	−0.02	0.08	−0.02	0.08	−0.02	0.08	−0.01	0.08
Educational attainment (ref. sec. school w. appr.)										
unskilled/no appr.	0.38	0.22	0.38	0.22	0.38	0.22	0.38	0.22	0.38	0.22
Hauptschule w. appr.	0.08	0.14	0.08	0.14	0.07	0.14	0.07	0.14	0.08	0.14
A level without tertiary degree	−0.15	0.12	−0.15	0.12	−0.17	0.12	−0.16	0.12	−0.16	0.12
tertiary degree	−0.19	0.13	−0.19	0.13	−0.19	0.13	−0.18	0.13	−0.20	0.13
Duration in the job	−0.00 ***	0.00	−0.00 ***	0.00	−0.00 ***	0.00	−0.00 ***	0.00	−0.00 ***	0.00

Table A2. Cont.

	Reading Literacy		Mathematical Literacy		ICT Literacy		Scientific Literacy		Cogn. Basic Literacy	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Occupational area (ref. social sector, teaching, etc.)										
agriculture, forestry, etc.	−0.71	0.51	−0.70	0.51	−0.71	0.51	−0.73	0.51	−0.71	0.51
prod. of raw materials, etc.	−0.16	0.10	−0.16	0.10	−0.17	0.10	−0.17	0.10	−0.17	0.10
construction, architecture, etc.	0.12	0.15	0.12	0.15	0.13	0.15	0.11	0.15	0.12	0.15
natural sciences, etc.	−0.07	0.13	−0.08	0.13	−0.08	0.13	−0.07	0.13	−0.08	0.13
traffic, logistics, etc.	−0.26 *	0.13	−0.25	0.13	−0.26 *	0.13	−0.27 *	0.13	−0.26 *	0.13
commercial services, etc.	−0.05	0.12	−0.05	0.12	−0.05	0.12	−0.05	0.12	−0.05	0.12
business organisation, etc.	−0.06	0.08	−0.06	0.08	−0.06	0.08	−0.06	0.08	−0.06	0.08
humanities, economics, etc.	−0.18	0.17	−0.18	0.17	−0.18	0.17	−0.17	0.17	−0.18	0.17
Occupational requirement level (ref. unskilled or semi-skilled)										
specialist	−0.04	0.14	−0.05	0.14	−0.04	0.14	−0.05	0.14	−0.04	0.14
complex specialist	−0.15	0.16	−0.15	0.16	−0.15	0.16	−0.16	0.16	−0.15	0.16
highly complex	0.18	0.18	0.18	0.18	0.19	0.18	0.18	0.18	0.19	0.18
Part-time job (ref. full-time job)	0.01	0.07	0.01	0.07	0.02	0.07	0.02	0.07	0.01	0.07
Workplace in East Germany (ref. workplace in West Germany)	0.06	0.08	0.06	0.08	0.06	0.08	0.06	0.08	0.06	0.08
Educational mismatch (ref. matched)										
undereducated	−0.07	0.11	−0.07	0.11	−0.05	0.11	−0.06	0.11	−0.06	0.11
overeducated	0.31 **	0.12	0.31 **	0.12	0.33 **	0.12	0.33 **	0.12	0.31 **	0.12
Conscientiousness	0.18 ***	0.04	0.18 ***	0.04	0.18 ***	0.04	0.18 ***	0.04	0.19 ***	0.04
Neuroticism	−0.34 ***	0.04	−0.34 ***	0.04	−0.34 ***	0.04	−0.34 ***	0.04	−0.34 ***	0.04
R-squared	0.11		0.11		0.11		0.11		0.11	

N = 3116; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Data: NEPS Adult Cohort, Version 11.1.0.

Table A3. Multiple linear regression analyses regarding objective skill mismatch and job satisfaction.

	Model 1		Model 2	
	Coef.	SE	Coef.	SE
Objective skill mismatch (ref. matched)	−0.10	0.08	−0.08	0.08
Subjective skill mismatch (ref. matched)			−1.01 ***	0.07
Male (ref. female)	−0.11	0.08	−0.13	0.08
Age	−0.00	0.00	−0.00	0.00
Immigration background (ref. no immigration background)	−0.05	0.08	−0.02	0.08
Educational attainment (ref. sec. school w. appr.)				
unskilled/no appr.	0.51 *	0.23	0.39	0.22
Hauptschule w. appr.	0.16	0.14	0.08	0.14
A level without tertiary degree	−0.21	0.12	−0.17	0.12
tertiary degree	−0.31 *	0.13	−0.19	0.13
Duration in the job	−0.00 ***	0.00	−0.00 ***	0.00

Table A3. Cont.

	Model 1		Model 2	
	Coef.	SE	Coef.	SE
Occupational area (ref. social sector, teaching, etc.)				
agriculture, forestry, etc.	−0.77	0.52	−0.72	0.51
prod. of raw materials, etc.	−0.27 **	0.10	−0.17	0.10
construction, architecture, etc.	0.00	0.16	0.12	0.15
natural sciences, etc.	−0.10	0.14	−0.08	0.13
traffic, logistics, etc.	−0.50 ***	0.13	−0.26 *	0.13
commercial services, etc.	−0.14	0.12	−0.06	0.12
business organisation, etc.	−0.10	0.08	−0.06	0.08
humanities, economics, etc.	−0.25	0.18	−0.18	0.17
Occupational requirement level (ref. unskilled or semi-skilled)				
specialist	0.04	0.15	−0.04	0.14
complex specialist	0.03	0.16	−0.15	0.16
highly complex	0.48 **	0.18	0.19	0.18
Part-time job (ref. full-time job)				
	−0.01	0.08	0.02	0.07
Workplace in East Germany (ref. workplace in West Germany)				
	0.03	0.08	0.06	0.07
Educational mismatch (ref. matched)				
undereducated	−0.14	0.12	−0.06	0.11
overeducated	0.39 **	0.12	0.33 **	0.12
Conscientiousness				
	0.21 ***	0.04	0.18 ***	0.04
Neuroticism				
	−0.37 ***	0.04	−0.34 ***	0.04
R-squared				
	0.06		0.11	

N = 3116; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Data: NEPS Adult Cohort, Version 11.1.0.

Table A4. Multiple linear regression analyses regarding skill mismatch and job satisfaction excluding objective educational mismatch.

	Model 1		Model 2		Model 3	
	Coef.	SE	Coef.	SE	Coef.	SE
Subjective skill mismatch (ref. matched)	−1.02 ***	0.07			−1.01 ***	0.07
Objective skill mismatch (ref. matched)						
underskilled			−0.18	0.11	−0.12	0.11
overskilled			0.03	0.11	0.01	0.11
Male (ref. female)	−0.13	0.08	−0.13	0.08	−0.14	0.08
Age	−0.00	0.00	−0.00	0.00	−0.00	0.00
Immigration background (ref. no immigration background)	−0.01	0.08	−0.04	0.08	−0.00	0.08
Educational attainment (ref. sec. school w. appr.)						
unskilled/no appr.	0.30	0.20	0.36	0.21	0.31	0.20
Hauptschule w. appr.	0.01	0.10	0.04	0.11	0.02	0.10
A level without tertiary degree	0.07	0.09	0.05	0.09	0.06	0.09
tertiary degree	0.04	0.09	−0.03	0.09	0.02	0.09

Table A4. Cont.

	Model 1		Model 2		Model 3	
	Coef.	SE	Coef.	SE	Coef.	SE
Duration in the job	−0.00 ***	0.00	−0.00 **	0.00	−0.00 ***	0.00
Occupational area (ref. social sector, teaching, etc.)						
agriculture, forestry, etc.	−0.69	0.51	−0.72	0.52	−0.69	0.51
prod. of raw materials, etc.	−0.15	0.10	−0.25 *	0.10	−0.15	0.10
construction, architecture, etc.	0.14	0.15	0.03	0.16	0.14	0.15
natural sciences, etc.	−0.12	0.13	−0.17	0.14	−0.13	0.13
traffic, logistics, etc.	−0.21	0.13	−0.43 **	0.13	−0.21	0.13
commercial services, etc.	−0.02	0.12	−0.11	0.12	−0.03	0.12
business organisation, etc.	−0.03	0.08	−0.07	0.08	−0.04	0.08
humanities, economics, etc.	−0.23	0.17	−0.33	0.17	−0.23	0.17
Occupational requirement level (ref. unskilled or semi-skilled)						
specialist	−0.04	0.14	0.07	0.15	−0.03	0.14
complex specialist	−0.18	0.16	0.02	0.16	−0.16	0.16
highly complex	−0.03	0.16	0.23	0.17	−0.01	0.16
Part-time job (ref. full-time job)	0.01	0.07	−0.01	0.08	0.01	0.07
Workplace in East Germany (ref. workplace in West Germany)	0.07	0.07	0.06	0.08	0.08	0.08
Conscientiousness	0.19 ***	0.04	0.22 ***	0.04	0.19 ***	0.04
Neuroticism	−0.33 ***	0.04	−0.37 ***	0.04	−0.33 ***	0.04
R-squared		0.11		0.06		0.11

N = 3116; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Data: NEPS Adult Cohort, Version 11.1.0.

Notes

- ¹ The competency tests were collected at different points in time before the 2018 wave (reading literacy: 2010 wave, 2012 wave, 2016 wave; mathematical literacy: 2010 wave, 2016 wave; ICT literacy: 2012 wave; scientific literacy: 2012 wave; cognitive basic literacy: 2014 wave). In each skill domain, the most recent score was used as a proxy for the proficiency level of people who took part in several tests in one skill domain. The two personality traits, conscientiousness and neuroticism, were collected in the 2015 wave.
- ² People who “rather agree” or “completely agree” with the statement “The requirements of the job match my skills” were considered as the reference group for calculating skill requirements.
- ³ If an ISCO-08 two-digit occupational sub-major group had fewer than 20 observations, the skill requirements were calculated using the ISCO-08 one-digit occupational major group. If the minimum value of 20 observations was not reached even at the ISCO-08 one-digit level, no skill requirements could be set for the occupational groups concerned.
- ⁴ The control variable of objective educational mismatch is considered problematic for causal analytical considerations due to doubts of being a temporally preceding cause of objective skill mismatch. In the sensitivity analysis models without taking the control variable objective educational mismatch into account, there was a positive correlation between being objectively overskilled and job satisfaction. In the main models, taking into account the control variable objective educational mismatch, a negative correlation between being objectively overskilled and job satisfaction was found. However, in both cases the results were not significant.

References

- Allen, James Patrick, Mark Levels, and Rolf van der Velden. 2013. *Skill Mismatch and Use in Developed Countries: Evidence from the PIAAC Study*. Maastricht: ROA Research Memoranda.
- Allen, Jim, and Rolf van der Velden. 2001. Educational mismatches versus skill mismatches: Effects on wages, job satisfaction, and on-the-job search. *Oxford Economic Papers* 53: 434–52. [[CrossRef](#)]
- Badillo-Amador, Lourdes, Ángel López Nicolás, and Luis E. Vila. 2012. The consequences on job satisfaction of job–worker educational and skill mismatches in the Spanish labour market: A panel analysis. *Applied Economics Letters* 19: 319–24. [[CrossRef](#)]

- Béduwé, Catherine, and Jean-François Giret. 2011. Mismatch of vocational graduates: What penalty on French labour market? *Journal of Vocational Behavior* 78: 68–79. [CrossRef]
- Bilan, Yuriy, Halyna Mishchuk, Iryna Roshchuk, and Olena Joshi. 2020. Hiring and retaining skilled employees in SMES: Problems in human resource practices and links with organizational success. *Business: Theory and Practice* 21: 780–91. [CrossRef]
- Blossfeld, Hans-Peter, and Hans-Günther Roßbach, eds. 2019. *Education as a Lifelong Process: The German National Educational Panel Study (NEPS)*, 2nd ed. Wiesbaden: Verlag für Sozialwissenschaften.
- Blossfeld, Hans-Peter, Hans-Günther Roßbach, and Jutta von Maurice, eds. 2011. *Education as a Lifelong Process—The German National Educational Panel Study (NEPS)*. Zeitschrift für Erziehungswissenschaft: Sonderheft 14. Wiesbaden: Springer.
- Bönisch, Markus, Jakob Peterbauer, and Eduard Stöger. 2019. Skills Mismatch, Earnings and Job Satisfaction among Older Workers. *Sozialer Fortschritt* 68: 339–70. [CrossRef]
- Brunello, Giorgio, and Patricia Wruuck. 2019. *Skill Shortages and Skill Mismatch in Europe: A Review of the Literature*. Bonn: IZA—Institute of Labor Economics.
- Campbell, Angus, Philip E. Converse, and Willard L. Rodgers. 1976. *The Quality of American Life: Perceptions, Evaluations, and Satisfaction*. New York: Russel Sage Foundation.
- Cedefop. 2010. *The Skill Matching Challenge: Analysing Skill Mismatch and Policy Implications*. Luxembourg: Publications Office of the European Union.
- Cedefop. 2018. *Insights into Skill Shortages and Skill Mismatch: Learning from Cedefop's European Skills and Jobs Survey*. Cedefop Reference Series: Vol. 106; Luxembourg: Publications Office of the European Union.
- Cedefop and Eurofound. 2018. *Skills Forecast: Trends and Challenges to 2030*. Cedefop Reference Series: Vol. 108; Luxembourg: Publications Office of the European Union. Available online: <http://data.europa.eu/doi/10.2801/4492> (accessed on 12 October 2021).
- Clark, Andrew, Yannis Georgellis, and Peter Sanfey. 1998. Job satisfaction, wage changes, and quits: Evidence from Germany. *Research in Labor Economics* 17: 95–121.
- Cohen, Aaron, and Ronit Golan. 2007. Predicting absenteeism and turnover intentions by past absenteeism and work attitudes. *Career Development International* 12: 416–32. [CrossRef]
- Comyn, Paul, and Olga Strietska-Ilina. 2019. *Skills and Jobs Mismatches in Low- and Middle-Income Countries*. Geneva: International Labour Office.
- Congregado, Emilio, Jesús Iglesias, José Maria Millán, and Román Concepción. 2016. Incidence, effects, dynamics and routes out of overqualification in Europe: A comprehensive analysis distinguishing by employment status. *Applied Economics* 48: 411–45. [CrossRef]
- Cornelißen, Thomas. 2009. The Interaction of Job Satisfaction, Job Search, and Job Changes: An Empirical Investigation with German Panel Data. *Journal of Happiness Studies* 10: 367–84. [CrossRef]
- Cseh Papp, Imola, Svitlana Bilan, and Krisztina Dajnoki. 2018. Globalization of the labour market—Circular migration in Hungary. *Journal of International Studies* 12: 182–200. [CrossRef]
- Csikszentmihalyi, Mihaly. 1975. *Beyond Boredom and Anxiety*. San Francisco: Jossey-Bass.
- Csikszentmihalyi, Mihaly. 1990. *Flow: The Psychology of Optimal Experience*. New York: Harper Perennial.
- Edwards, Jeffrey R. 1991. *Person-Job Fit: A Conceptual Integration, Literature Review, and Methodologicalcritique*. New York: Wiley.
- Edwards, Jeffrey R. 1996. An Examination of Competing Versions of the Person-Environment Fit Approach to Stress. *The Academy of Management Journal* 39: 292–339.
- Elwert, Felix, and Christopher Winship. 2014. Endogenous Selection Bias: The Problem of Conditioning on a Collider Variable. *Annual Review of Sociology* 40: 31–53. [CrossRef] [PubMed]
- Feldman, Daniel C., Carrie R. Leana, and Mark C. Bolino. 2002. Underemployment and relative deprivation among re-employed executives. *Journal of Occupational and Organizational Psychology* 75: 473–71. [CrossRef]
- Fregin, Marie-Christine, Ineke Bijlsma, and Rolf van der Velden. 2018. *Much Ado about Social Outcomes? Effective Skill, Skill Mismatch, and Their Own Relation with Job Satisfaction and Other Social Outcomes*. Maastricht: ROA Research Memoranda.
- French, John R. P., Robert D. Caplan, and R. Van Harrison. 1982. *The Mechanisms of Job Stress and Strain*. Chichester: Wiley.
- García-Aracil, Adela, and Rolf van der Velden. 2008. Competencies for young European higher education graduates: Labor market mismatches and their payoffs. *Higher Education* 55: 219–39. [CrossRef]
- García-Mainar, Inmaculada, and Victor Manuel Montuenga-Gómez. 2020. Over-Qualification and the Dimensions of Job Satisfaction. *Social Indicators Research* 147: 591–620. [CrossRef]
- Goldberg, Caren B., and David A. Waldman. 2000. Modeling employee absenteeism: Testing alternative measures and mediated effects based on job satisfaction. *Journal of Organizational Behavior* 21: 665–76. [CrossRef]
- Green, Francis. 2010. Well-being, job satisfaction and labour mobility. *Labour Economics* 17: 897–903. [CrossRef]
- Green, Francis, and Yu Zhu. 2010. Overqualification, job dissatisfaction, and increasing dispersion in the returns to graduate education. *Oxford Economic Papers* 62: 740–63. [CrossRef]
- International Labour Office. 2018. 20th International Conference of Labour Statisticians, Geneva, 10–19 October 2018: Guidelines Concerning Measurement of Qualifications and Skills Mismatches of Persons in Employment. ICLS/20/2018/Guidelines. Available online: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/meetingdocument/wcms_648557.pdf (accessed on 12 October 2021).

- International Labour Organization. 2015. *Anticipating and Matching Skills and Jobs*. Guidance Note. Geneva: International Labour Office. Available online: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_534307.pdf (accessed on 12 October 2021).
- Kristensen, Nicolai, and Nils Westergaard-Nielsen. 2004. *Does Low Job Satisfaction Lead to Job Mobility?* Bonn: IZA—Institute of Labor Economics.
- Liu, Songqi, and Mo Wang. 2012. Perceived overqualification: A review and recommendations for research and practice. In *The Role of the Economic Crisis on Occupational Stress and Well Being: Research in Occupational Stress and Well Being*. Bingley: Emerald Group Publishing Limited, vol. 10, pp. 1–42.
- Maltarich, Mark A., Greg Reilly, and Anthony J. Nyberg. 2011. Objective and Subjective Overqualification: Distinctions, Relationships, and a Place for Each in the Literature. *Industrial and Organizational Psychology* 4: 236–39. [CrossRef]
- Mateos-Romero, Lucía, and Mariá del Mar Salinas-Jiménez. 2018. Labor Mismatches: Effects on Wages and on Job Satisfaction in 17 OECD Countries. *Social Indicators Research* 140: 369–91. [CrossRef]
- Mavromaras, Kostas, Peter J. Sloane, and Wei Zhang. 2012. The role of education pathways in the relationship between job mismatch, wages and job satisfaction: A panel estimation approach. *Education Economics* 20: 303–21. [CrossRef]
- Mavromaras, Kostas, Seamus McGuinness, Nigel O’Leary, Peter Sloane, and Wei Zhang. 2013. Job Mismatches and Labour Market Outcomes: Panel Evidence on University Graduates. *Economic Record* 89: 382–95. [CrossRef]
- McGuinness, Seamus, Konstantinos Pouliakas, and Paul Redmond. 2018. Skills mismatch: Concepts, measurement and policy approaches. *Journal of Economic Surveys* 32: 985–1015. [CrossRef]
- McKee-Ryan, Frances M., Meghna Virick, Gregory E. Prussia, Jaron Harvey, and Juliana D. Lilly. 2009. Life after the layoff: Getting a job worth keeping. *Journal of Organizational Behavior* 30: 561–80. [CrossRef]
- Nikolov, Adrian, Desislava Nikolova, Peter Ganev, and Yavor Aleksiev. 2018. *Skills Mismatches: An Impediment to the Competitiveness of EU Businesses*. Bruxelles: European Economic and Social Committee. [CrossRef]
- OECD. 2019. *OECD Skills Outlook 2019: Thriving in a Digital World*. Paris: OECD Publishing.
- Pauceanu, Alexandrina Maria, Nada Rabie, and Ayman Moustafa. 2020. Employability in the fourth industrial revolution. *Economics and Sociology* 13: 269–83. [CrossRef]
- Shevchuk, Andrey, Denis Strebkov, and Shannon N. Davis. 2019. Skill mismatch and work–life conflict: The mediating role of job satisfaction. *Journal of Education and Work* 32: 181–95. [CrossRef]
- Shobe, Kyle. 2018. Productivity Driven by Job Satisfaction, Physical Work Environment, Management Support and Job Autonomy. *Business and Economics Journal* 9: 351. [CrossRef]
- Smith, Craig A., and Richard S. Lazarus. 1990. Emotion and Adaption. In *Handbook of Personality: Theory and Research*. Edited by Lawrence A. Pervin. New York: The Guilford Press, pp. 609–37.
- Spector, Paul E. 1997. *Job Satisfaction: Application, Assessment, Causes, and Consequences*. Thousand Oaks: SAGE Publications.
- Van der Velden, Rolf, and Dieter Verhaest. 2017. Are Skill Deficits always Bad? Toward a Learning Perspective on Skill Mismatches. *Research in Labor Economics* 45: 305–43. [CrossRef]
- Van Oortmerssen, Lisa A., Marjolein C. J. Caniëls, and Marcel F. van Assen. 2020. Coping with Work Stressors and Paving the Way for Flow: Challenge and Hindrance Demands, Humor, and Cynicism. *Journal of Happiness Studies* 21: 2257–77. [CrossRef]
- Vieira, José A. Cabral. 2005. Skill mismatches and job satisfaction. *Economics Letters* 89: 39–47. [CrossRef]
- Weinert, Sabine, Cordula Artelt, Manfred Prenzel, Martin Senkbeil, Timo Ehmke, Claus H. Carstensen, and Kathrin Lockl. 2019. Development of Competencies Across the Life Course. In *Education as a Lifelong Process: The German National Educational Panel Study (NEPS)*, 2nd ed. Edited by H. P. Blossfeld and H. G. Roßbach. Wiesbaden: Verlag für Sozialwissenschaften, pp. 57–81.
- World Economic Forum. 2014. *Matching Skills and Labour Market Needs: Building Social Partnerships for Better Skills and Better Jobs*. Available online: https://www3.weforum.org/docs/GAC/2014/WEF_GAC_Employment_MatchingSkillsLabourMarket_Report_2014.pdf (accessed on 12 October 2021).