Felix Wenzelmann | Paula Risius | Andries de Grip

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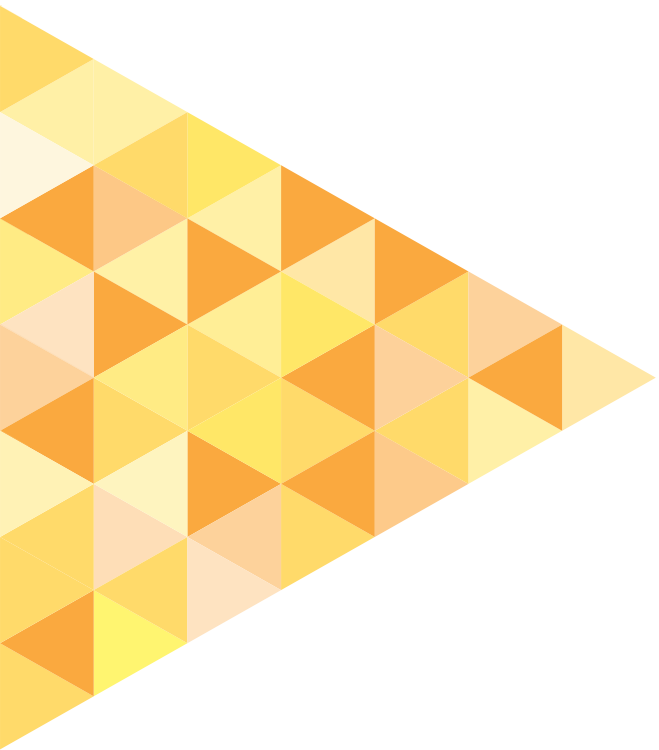

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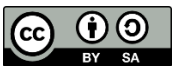

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Increasing firms' motivation to train low-skilled youth: A factorial survey experiment

Felix Wenzelmann[1], Paula Risius[2], Andries de Grip[3]

Abstract:

The German system of apprenticeship training is often claimed as an important driver for the good integration of youth in the labour market. Nonetheless, a steady share of 13% of school graduates who would like to start an apprenticeship are unable to find a training position. In this paper, we use a factorial survey experiment, which we included, in a large-scale firm survey on apprenticeship training to analyse whether a financial or a non-financial bonus scheme could increase firms´ willingness to train low-skilled youth. In the experiment, we ask firms to rate the probability of providing a training position to hypothetical applicants that vary on cognitive and social skills and the possibility of receiving financial or non-financial support. We find that both applicants' cognitive and non-cognitive skills are highly important for a firm's decision to offer low-skilled applicants a training position. High non-cognitive skills can compensate for low cognitive skills. However, neither financial nor non-financial support can compensate for a low cognitive or non-cognitive skill level, as the effects of both support measures are rather weak.

[1] Felix Wenzelmann (corresponding author) Federal Institute for Vocational Education and Training (BIBB), Bonn, Germany, wenzelmann@bibb.de

[2] Paula Risius, German Economic Institute (IW Koeln), Germany, risius@iwkoeln.de

[3] Andries de Grip, Research Centre for Education and the Labour Market (ROA) of Maastricht University, The Netherlands, a.degrip@maastrichtuniversity.nl

Content

1. Introduction

The meta-studies of Card et al. (2010; 2018) and Vooren et al. (2019a) show that the effectiveness of active labour market programs (ALMPs) which aim to re-integrate low-skilled workers into the labour market is low. Heckman (2007) argues that this is because investments in training later in life that hardly build on initial training have low results as they don't benefit from the dynamic complementarity with earlier investments in a person's human capital. Although this means that investments in training are best when they are done before someone enters the labour market, there will still be youngsters who leave school with a low skill level.

The German system of apprenticeship training is famous for its duality. The training is provided in a training firm at three or four days a week and at one or two days in a vocational school. Each training vocation has a training regulation framework which includes the training content for both venues (Franz and Soskice 1995). The leaving certificates are recognized nationwide. The system is market driven as firms and apprentices participate voluntary and sign a binding contract for the complete

training period. Therefore, the system is often claimed as an important driver for the good integration of youth into the labour market (e.g. Mohrenweiser et al. 2019), as most German firms train youth in order to retain the apprentices as skilled workers after successful completion of the training (e.g. Schönfeld et al. 2020).

The number of apprenticeships firms provide is strongly linked with their expected future demand for skilled workers. Before the COVID-19 pandemic started in March 2020, the demand for skilled workers in Germany grew steadily for several years (Maier et al. 2020), resulting in skills shortages in various sectors of industries and regions. Accordingly, the number of apprenticeship positions increased until 2019 (Milde et al. 2020). As some firms did not receive any applications that met the required level of general schooling or social skills, the number of unfilled apprenticeship positions grew by 167% during the past decade and was at 9.4 percent in 2019 (Milde et al. 2020, p. 16). However, during these years, a steady share of 13% of school leavers interested in starting an apprenticeship could not find a position (ibid.). The poor matching of applicants and vacant training positions might be related to firms' preference for applicants with strong cognitive and non-cognitive skills, which some applicants lack (Holtmann et al*.,* 2020). This raises the question whether it will be fruitful to subsidize the participation of low-skilled youth in apprenticeship training to better integrate them early in their working careers. To our knowledge, there are hardly any studies that have addressed this mismatch.

In this paper, we retrace mismatches to firms' reluctance to offer apprenticeship positions to applicants who do not fit their job requirements. In addition, we analyse the effectiveness of an active labour market program (ALMP) that was introduced to increase firms' willingness to train low-skilled applicants and comprises both financial and non-financial support. Studies that shed light on the effectiveness of these ALMPs are scarce. An exception is Bonin et al*.* (2013), who find that financial subsidies only seem to provoke dead-weight effects instead of increasing the participation of low-skilled youth in the labour market. There are no studies on the impact of non-financial support for the labour market integration of low-skilled applicants.

Since firms that train low-skilled youth are often eligible for several support schemes, there is a need for a more thorough evaluation of the effectiveness of these schemes. We contribute to previous research by focusing on the effects of financial and non-financial support schemes for applicants with different skill levels. In addition, we contribute to the literature by investigating whether support schemes for low-skilled applicants effectively motivate firms to provide additional training positions to these applicants. Our study is the first to investigate the impact of support schemes concerning the cognitive and non-cognitive skills of applicants for apprenticeships. We aim to answer the following questions:

- To what extent is firms' willingness to train low-skilled apprentices hampered by low cognitive and social skills of applicants?
- Can high non-cognitive skills compensate for low cognitive skills?
- Can financial support and/or external coaching compensate for low skills?
- Do training firms react differently to these stimuli than non-training firms?

To answer these questions, we conducted a factorial survey experiment (FSE) among firm recruiters that focuses on applicants' cognitive and social skills as well as financial and non-financial support schemes.

We integrated this experiment in the BIBB-Cost-Benefit Survey (BIBB-CBS) 2017/18 (Schönfeld et al. 2020) by posing the experiment questions to a randomly chosen subsample of approximately one-third of the sample (1,102 firms). The respondents had to rate the probability of providing an apprenticeship position to six hypothetical applicants, which gives us data on 6,599 applicant ratings. The applicants differ with respect to their cognitive and non-cognitive skills, and whether the firm would receive a subsidy or external coaching support.

We find that applicants' cognitive and non-cognitive skills highly impact a firm's decision to offer low-skilled applicants a training position. High non-cognitive skills can compensate for a lack of cognitive skills. Neither financial nor non-financial support can compensate a low cognitive or non-cognitive skill level. However, non-training firms show a stronger reaction to non-financial support than firms that already train apprentices.

The remainder of the paper is organised as follows. Section 2 provides an overview of the empirical literature on the impact of applicant characteristics and firm-level factors on recruitment decisions as well as the literature on the effectiveness of subsidies for apprenticeship training. In Section 3, we describe the data, the FSE, its attributes and attribute values, and our empirical approach. Section 4 discusses our results, and Section 5 concludes the paper.

2. Literature review

According to economic theory, firms aim to maximise their utility during the recruitment process: Firms hire the applicant with the highest net benefits. They base this decision on the cost-benefit ratios for the various applicants. On the one hand, a firm faces various costs during the apprenticeship period, i.e., apprentices' wages, costs for the trainers, for infrastructure and materials (e.g., Schönfeld et al., 2020). On the other hand, apprentices contribute to the firm's production during the training period and as skilled workers when they stay with the firm afterwards. However, firms will only have these

long-term benefits if an apprentice successfully completes the training, fulfils the firm's requirements for a job offer, and accepts this offer.

Cognitive and non-cognitive skills: Various studies show that an applicant's skills are highly important for the recruitment of apprentices as they potentially affect both costs (Kis 2016; Mohrenweiser et al. 2019) and benefits (Pfeifer and Jansen 2017). Firms' motivation to train weak applicants will therefore be low. Firms use applicants' cognitive and non-cognitive skills as signals of their ability to complete the training successfully when hiring apprentices (e.g., Protsch 2017). Firms particularly take grades of general schooling into account during apprentice selection to avoid drop-out-induced termination of the apprenticeship contract (Muehlemann et al. 2007).

In recent years, non-cognitive skills have become more important. Weinberger (2014) finds that in the USA labour market, the demand for both cognitive and non-cognitive skills increased through the 1980s and 1990s. Likewise, Deming (2017) finds that the importance of social skills increased significantly between 1980 and 2012. This explains why non-cognitive skills also play a key role in firms' recruitment. Especially behavioural characteristics are crucial for the employer's hiring decision (Protsch and Solga 2015). Protsch et al. (2017) investigate the effects of performance indicators within school leaving certificates on hiring decisions and use days of absence and social behaviour as signals for applicants' non-cognitive skills. They find that these non-cognitive skills have a slightly larger effect than cognitive skills (as measured by the average grade). Building on two field experiments with similar variables, Protsch and Solga (2015) find that both cognitive and non-cognitive skills are selection criteria for firms when recruiting apprentices. Vooren et al. (2019b) find similar results using a discrete choice experiment in the IT-sector.

Several types of non-cognitive skills impact firms' training decisions as well as the probability of training success. For most vocations, communication skills are essential (Robles 2012). Their relevance is recently increasing all over the labour market, as reflected in the fact that effective communication is a core 21st-century skill (e.g., Ananiadoui and Claro 2009). According to Robles (2012), politeness – or, as she calls it, courtesy – is another crucial non-cognitive skill for getting an apprenticeship position. A predictor of training success is vocational interest. Diedrich et al. (2018) show that vocational interests affect training success in three out of five branches.

Effectiveness of ALMPs: With respect to the effectiveness of ALMPs aiming to increase firms' willingness to recruit weaker applicants, many studies focus on financial support measures. These studies have mixed outcomes (Liechti et al. 2017). In a literature review study, Clayton et al. (2012) conclude that bonus schemes must neither be too low nor too high to be effective, since too low bonuses do not sufficiently cover additional costs while too high bonuses lead to segregation of vulnerable groups. Deuchert and Kauer (2017) find that firms take an applicant's eligibility for an ALMP

as a signal for low productivity. Financial subsidies can, therefore, even increase a firm's resistance to hiring an eligible applicant. Another potential drawback is that financial subsidies may cause deadweight losses. Bonin et al. (2013) have shown that in Germany, a training subsidy of 4,000-6,000 Euro per additional apprentice suffered from severe deadweight losses and had only marginal effects on firms' training willingness.

ALMPs can also refer to other instruments: Since low-skilled youth often need more instruction time (Kis 2016), offering external support through coaching might stimulate firms' willingness to hire weaker applicants. In their evaluation of a German scheme of training assistance which provides support from external coaches to apprentices and their training firms, Reinbothe et al. (2019) show that this coaching measure increases apprentices' motivation and their professional development. To our knowledge, there are no studies that investigate the effect of financial or non-financial support schemes that aim to increase the hiring of apprentices with weaker cognitive or non-cognitive skills.

3. Data and method

3.1 Data

We conducted a FSE which we included in the BIBB-CBS 2017/18 (Schönfeld et al. 2020). There, 3,049 training and 996 non-training firms answered questions on various topics related to apprenticeship training and the recruitment of skilled workers. Hence, responses from firms that currently train apprentices are largely overrepresented. We drew a random subsample of approximately one-third of all respondents[1], leaving us with 1,102 respondents. To answer the research question of whether non-training firms respond differently to ALMPs, we conduct separate analyses for training and non-training firms. Table S2 presents some descriptive statistics of the dataset. Respondents from the training firms are responsible for the training decisions and the recruitment of apprentices (see online supplemental material). Respondents from the non-training firms are more generally responsible for the firm's human resource practices. In small firms, this is in both cases often the owner of the firm. The survey focuses on one specific vocation per respondent[2] and collects a large amount of additional information on firms and respondents. The survey was conducted as computer assisted personal interviews (CAPI). The sample used was drawn from the German Federal Employment Agency (BA) firm

[1] Other subsamples received vignettes on one of two discrete choice experiments (see Wehner et al. 2022; Caliendo et al. 2022).

[2] In training firms, the vocation is randomly chosen from the vocations the firm trains at the beginning of the interview. About two thirds train only one vocation. In non-training firms, the vocation of the skilled worker last recruited is chosen.

database, which includes all firms with at least one employee subject to mandatory social insurance contributions.

3.2 The factorial survey experiment (FSE)

Various studies use FSEs to assess recruitment processes. These experiments measure the effects of several attributes at the same time, while being less prone to social desirability bias (Alexander and Becker 1978). Most of the more recent studies focus on university graduates (e.g., Humburg and van der Velden 2015) or discrimination (e.g., Karpinska et al. 2013; Mergener and Maier 2019). Protsch et al. (2017) and Kübler et al. (2018) analyse the recruitment process of apprentices.

The pros and cons of FSEs have been largely discussed (e.g., Auspurg and Hinz 2014): While the experimental design allows for causal interpretation of results, the presented setting is hypothetical, which may reduce external validity. Our experiment closely resembles the respondents' everyday working tasks as they are actually involved in recruitment decisions and closely in touch with the apprentices, which likely increases external validity (Hainmueller et al. 2015).

We present a setting to the respondents in which a 19-year-old applied to their firm after the official beginning of the training year. The described person could not find a training place within the prior application period, predominantly due to low cognitive or social skills, and therefore belongs to the group of low-skilled applicants as we define it. It is common that unsuccessful applicants continue their search for a training position while firms with open positions continue to search apprentices even after the training year has started. We chose this additional stage of the recruitment process, taking place after the official beginning of the training year, as our scenario for two reasons: First, to underline the deficits of the applicants and, second, to minimize the possibility of dead-weight effects of the ALMP by the clear framing that they would only be granted the subsidy if they accept an additional applicant with potential deficits and not someone they would have trained even without a subsidy.

Respondents have to rate on an 11-point scale[3] how likely they are to offer the applicant an apprenticeship position. The applicants' propositions differ on five individual attributes as well as whether the firm would receive financial and/or non-financial support for the applicant's training (see Section 3.3).

In total, we generate 288 unique hypothetical applicants. Following Auspurg and Hinz (2014), we use a full factorial design to capture multidimensional interaction effects and split the 288 profiles into 48 randomly built decks of six applicants each. Each respondent evaluated one randomly chosen deck,

[3] For the analyses, we recoded the answers into four categories, see section 4.1.

amounting to in total 6,599 applicant ratings[4]. This implies there are approximately 23 ratings for each hypothetical applicant.

3.3 Attributes and attribute values

The hypothetical applicants differ with respect to their cognitive and non-cognitive skills as well as on the support the firm receives when employing the applicant.

Table S1 gives an overview of the six hypothetical attributes of the applicants (see online supplemental material).

Cognitive skills: The first attribute consists of the educational background of the applicants as a proxy for their cognitive skills. The attribute combines the level of applicants' general school certificates and their average grade. We distinguish between applicants with a lower-secondary diploma (i.e., nine years of schooling) and with an intermediate-secondary diploma (i.e., ten years of schooling).

Regarding the average grade, we follow Kübler et al. (2018) and Protsch et al. (2017) by distinguishing between average grades of 2.8 vs. 3.4. An average grade of 2.8 is a mediocre grade for an applicant for an apprenticeship, while 3.4 is a poor grade (Kübler et al. 2018). We expect that the probability to be hired is higher when the diploma-grade combination is better.

Non-cognitive skills: We use three attributes to describe applicants' non-cognitive skills. First, building on Diedrich et al. (2018), we use applicants' interest in the training vocation (low vs. high interest) as a signal for their motivation. Although vocational interest could have several dimensions (e.g., Holland 1969), we use vocational interest in general to keep the number of attributes manageable.

Second, we include applicants' communication skills (weak vs. strong). Communication skills are easily observable and, hence, likely to be considered in an actual recruiting process.

Third, we use applicants' politeness (polite vs. impolite). Robles (2012) found that politeness is, right after integrity and communication, one of the three most important non-cognitive skills. We include politeness in the experiment instead of integrity since integrity is less easily observable in the recruitment process and cannot be operationalised easily in an experiment.

ALMPs: The FSE includes two attributes that refer to the ALMP for recruiting an applicant. As we particularly aim to add to the research in this area on low-skilled youth, we have included strong incentives for the firms in our experiment. First, a financial subsidy that firms receive if they train the applicant. This ALMP attribute has three values: no subsidy, 50%, or 100% of the monthly gross training

[4] Some respondents did not evaluate all six vignettes.

allowance for the apprentice. The firms receive this subsidy monthly over the complete duration of the apprenticeship. Second, free-of-charge external support by a consultant supporting the firm in all aspects regarding the apprenticeship and potential problems the apprentice has in school or at work. Here, we also use three values: no support, four, or eight hours support per week.

The actual training costs give an impression of the size of the subsidy. Schönfeld et al. (2020) calculate average gross costs of training at almost 21,000 Euro for the training year 2017/18, short-term benefits of 14,400 Euro and hence average net costs of 6,600 Euro per year. The average gross monthly training allowance is around 750 Euro in the training year 2017/18. Hence, a 100-% subsidy would on average amount to almost 9,000 Euro per training year and should cover the total net training costs for many firms.

Calculations based on the BIBB-CBS 2017/18 show that skilled workers who train the apprentices spend on average around 6.7 hours per apprentice per week on this task. The incentive of additional external support thus represents a substantial amount of training support. Multiplying these hours with the average wage costs for a skilled worker (around 23 Euro per hour) values the external support as about the same as the financial subsidies.

For both ALMPs, we expect that they might compensate the costs of recruiting a weaker applicant substantially.

3.4 Empirical approach

Factorial survey data can best be analysed by using either cluster-robust models or multilevel models (Alexander and Becker 1978). As the interclass-correlation coefficient results in a value of 0.3 in a model that includes only the six attributes of the experiment, explicitly modelling the nested data structure using a multilevel model is empirically not justified (Auspurg and Hinz 2014). Therefore, and as our dependent variable is ordinal, we use a cluster-robust generalised logistic regression model (gologit2, see Williams 2006).

We run two such regressions using the full sample (Table 1). In the first model, we only include the applicants' attributes. In the second model, we include controls on:

- The firm level: perceived skill shortages (5 level scale), training activity (2 classes), firm size (4 classes), and the economic sector (5 classes).
- The level of the respondent: gender, educational degree (4 degrees), tenure, and the level of involvement in training decisions.
- The extended supply demand ratio (SDR) of apprenticeship positions in the region (e.g., Milde *et al.,* 2020): This represents the number of provided training positions per 100

applicants in each region. Here, we use the public employment agency district as a regional unit.

- The share of apprentices with a high-school diploma in the training vocation[5]: In vocations with a high share of apprentices with high-school diplomas, firms are probably less likely to hire applicants with lower general education.

Next, we divide the sample into training and non-training firms, as we expect differences in their ratings of applicants. We rerun the second model for each subsample. To analyse whether financial or non-financial support has a more positive impact for applicants with lower cognitive or social skills, we extend the second model by including interaction terms of the support attributes with the skill attributes. We perform robustness checks to verify the quality of our estimates.

4. Results

4.1 Descriptive Results

Firms rate the likelihood to offer the applicants included in the experiment an apprenticeship position on an 11-point scale. Firms are generally reluctant to offer weak applicants an apprenticeship position. They rate the applicants with an average value of three points, while ten points would be the highest rating possible. Almost one-third of all evaluations result in a score of zero points. Forty-nine respondents show no willingness to train any apprentice under the given conditions as they rate all applicants with a score of zero partly boost this issue. Another third of the evaluations range up to three points, which would probably also result in rejecting these applicants. Around 20% of all ratings indicate a medium interest in the applicants, whereas 14% of all ratings reach eight or more points. As the right-skewness of the ratings is problematic for regression, we restructure the variable by grouping the ratings into four categories that reflect a willingness of zero (rating of 0), a low willingness (ratings of 1-3), a medium willingness (ratings of 4-7) or a high willingness (ratings of 8-10) to train the described applicant, respectively.[6]

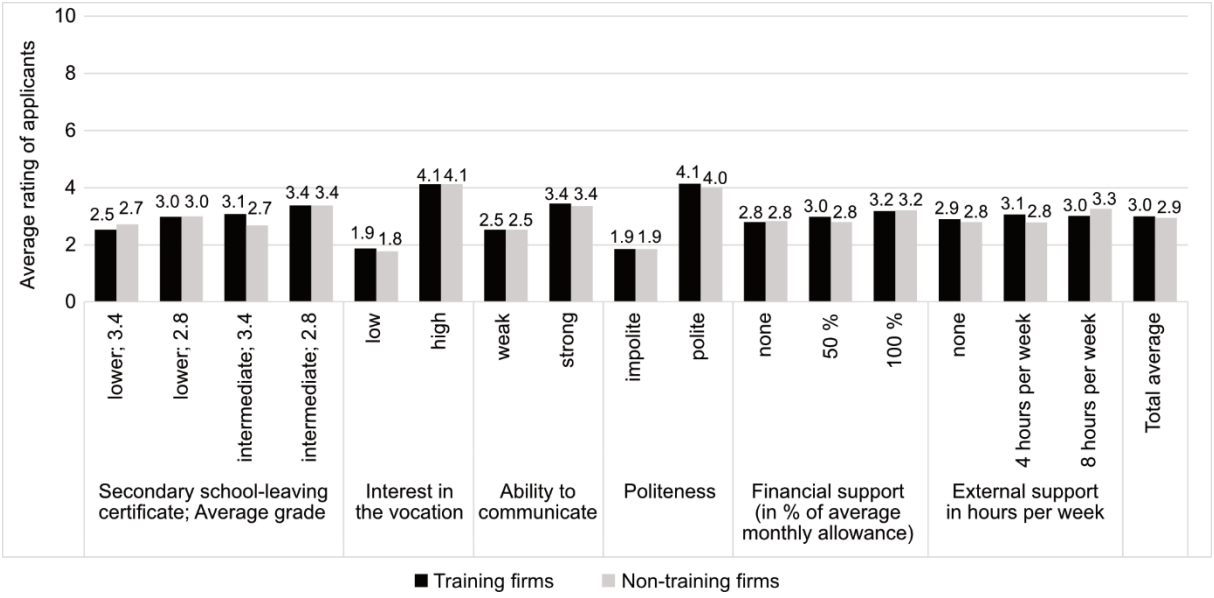
Figure 1 shows that the ratings vary across the attribute dimensions. Applicants with lower secondary education and a weak average grade have the lowest rating. However, better applicants with lower secondary education and the worse applicants with intermediate secondary education receive similarly low ratings. Non-training firms seem to focus more on the grade than training firms. For all

[5] We cluster training vocations by using the 4-digit value of the KLDB2010 (Bundesagentur für Arbeit 2011).
[6] We provided the analysis with a different grouping (0; 1-4; 5-7; 8-10) and with the original variable and an ordered logit regression as well. Results remained largely unchanged and are available from the authors upon request.

three non-cognitive skills, the ratings of the weak and strong applicants also differ significantly. While firms evaluate applicants with a high level of interest in the vocation with an average score of 4.1, the average rating is 1.8 when an applicant's vocational interest is low. The difference between impolite and polite applicants is similarly large. The effect of communication skills, however, is somewhat smaller. Ratings of training and non-training firms do not differ for the non-cognitive attributes of the applicants.

For the ALMPs, the differences within the full sample are rather small. Financial support of 100-% of the allowance increases the likelihood of offering an apprenticeship by only 0.4 points compared to a situation without financial support. Among the training firms, external support has the lowest influence on recruiters' willingness to recruit the applicant. There are only a few significant differences in the ratings by firm- and respondent characteristics. Male respondents and respondents who are solely responsible for decisions on training issues rate applicants slightly better than their counterparts, and respondents with an academic degree rate applicants less positively than respondents with a lower degree.

Figure 1: Average rating of applicants by value of the attributes



Source: BIBB-CBS 2017/2018; n = 6,599

4.2 Regression results

In Table 1, we present the estimation results of the two generalised logistic regression models on the full sample. The first basic model only includes the applicants' characteristics; the full model includes all firm, respondent, and contextual characteristics. The table shows that two of the non-cognitive attributes –interest in the vocation and politeness – have the highest impact on the probability that the rating reaches a higher category. The coefficients of the other skills are significant but smaller on

average. Hence, politeness and vocational interest are more important to employers' training decisions than cognitive skills. Similarly, the ALMPs appear to affect firms' willingness to train. Financial support of 50% of the gross training allowance has a significant linear impact on the probability to offer an apprenticeship position to the applicants. Financial support of 100% increases the probability of higher ratings significantly at the 1%-level, especially the probability of a high rating increases. The impact of non-financial support is, however, low. When eight hours of external support per week are provided, the rating slightly increases, although only at the 10%-significance level. Contrastingly, being offered four hours of external support does not affect the rating.

Table 1: Generalised logistic regression models on rating category*: Basic model (applicant characteristics) and full model

		Basic model				**Full model**		
		1	**2**	**3**		**1**	**2**	**3**
Applicant characteristics								
General schooling & average grade (base: lower secondary diploma; high grade)	Lower level with low grade		0.236***				0.249***	
			0,062				0,063	
	Intermediate level with high grade	0.473***	0.366***	0.167*		0.497***	0.406***	0.205**
		0,072	0,073	0,094		0,074	0,075	0,097
	Intermediate level with low grade		0.526***				0.560***	
			0,059				0,062	
Interest in the vocation (base: low interest)	High interest	1.240***	1.751***	1.911***		1.333***	1.853***	1.988***
		0,055	0,069	0,112		0,058	0,073	0,116
Communication skills (base: weak skills)	Strong skills	0.591***	0.701***	0.912***		0.617***	0.738***	0.967***
		0,051	0,057	0,082		0,053	0,06	0,085
Politeness (base: impolite)	Polite	1.369***	1.743***	1.819***		1.469***	1.850***	1.915***
		0,058	0,069	0,111		0,061	0,073	0,115
Financial support (in % of average monthly allowance; base: 0%)	50%		0.113**				0.114**	
			0,045				0,048	
	100%	0.185***	0.233***	0.410***		0.200***	0.247***	0.442***
		0,054	0,058	0,077		0,057	0,061	0,081
External support (in hours per week; base: 0 hours)	4 hours		0,058				0,059	
			0,047				0,05	
	8 hours		0.084*				0.087*	
			0,046				0,048	
Firm characteristics								
Firms' rating of skill shortages						0,02	0.142***	0.248***
						0,048	0,043	0,054

Training participation (base: no participation)	Participation				-0,022 0,101	
Firm size (base: 1 to 9 employees)	10 to 49 employees				0,049 0,099	
	50 to 499 employees				0.339*** 0,113	
	500 or more employees				0.308* 0,176	
Economic sector (base: manufacturing)	Trade, transportation and hospitality				-0.192* 0,104	
	Information and communication, finance and insurance			-0.433** 0,207	0,01 0,217	0,037 0,223
	Services				-0,141 0,111	
	Public services, education, health and welfare				-0,098 0,126	
Individual characteristics of the respondent						
Gender (base: female)	male				0.181** 0,079	
Educational degree (base: VET or less)	Bachelor or Meister				-0,047 0,102	
	Academic degree				-0.191* 0,107	
Tenure in years				-0.019*** 0,005	-0.007* 0,004	-0.012** 0,005
Involvement in the training decision (base: "I decide alone")	"I decide together with others"			0.206* 0,118	-0,136 0,1	-0.262** 0,127
	"I support or advice the decision"			0,297 0,195	-0,096 0,16	-0,309 0,2
	"I'm not part of the decision"				-0,059 0,246	
Contextual variables						
Overall share of apprentices with 'Abitur' in vocation (in %)					-0.019*** 0,002	
Regional supply-demand ratio 2017					0.016*** 0,005	
Constant		-1.092***	-3.415***	-1.934***	-4.832***	-6.994***

	0,089	0,123	0,205		0,52	0,525	0,572	
Observations	6599				6599			
Pseudo R[2]	0,127				0,164			

Source: BIBB-CBS 2017/18

Stars indicate significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the level of the respondent and reported in the second row.

*Rating categories: 1 = low willingness (ratings of 1-3), 2 = medium willingness (ratings of 4-7) and 3 = high willingness (ratings of 8-10) to train the applicant.

The table shows that the coefficients of the applicants' attributes remain remarkably stable throughout the models, implicating that the results are independent of firm, recruiter, and contextual characteristics.

Regarding the firm-level variables, we find that firms that report skill shortages are more likely to recruit the applicants. Firm size, however, is insignificant in almost all models.

Recruiters' characteristics have some impact as well, but the coefficients are, like those of the firm-level variables, small. Male recruiters' ratings are significantly higher, whereas those with an academic degree are less likely to offer a training position. The longer recruiters work in the firm, the less likely they are to give low-skilled applicants a chance. Compared to respondents who decide alone on hiring apprentices, only those respondents who decide together with others are significantly less likely to recruit an applicant.

The contextual factors also affect the ratings. The higher the share of apprentices with a high-school diploma in the vocation, the lower the likelihood that a firm offers a position. However, the coefficient is very small. Also, when the local market for apprenticeships is tighter (higher SDR) the probability of a higher rating increases significantly but remains small.

4.3 Training versus non-training firms

Rerunning the second model for training and non-training firms separately, three issues seem to be of interest.[7] First, performance in general education matters less for non-training firms, as only the coefficient of intermediate-level education with a low grade is significant. Second, financial support has less influence on the hiring probability of non-training firms. Third, for training firms, external support by a consultant does not influence the probability of recruiting an applicant. Among non-training firms, however, the coefficients for 8 hours of external support are positive and significant.

[7] Estimation results can be obtained from the corresponding author.

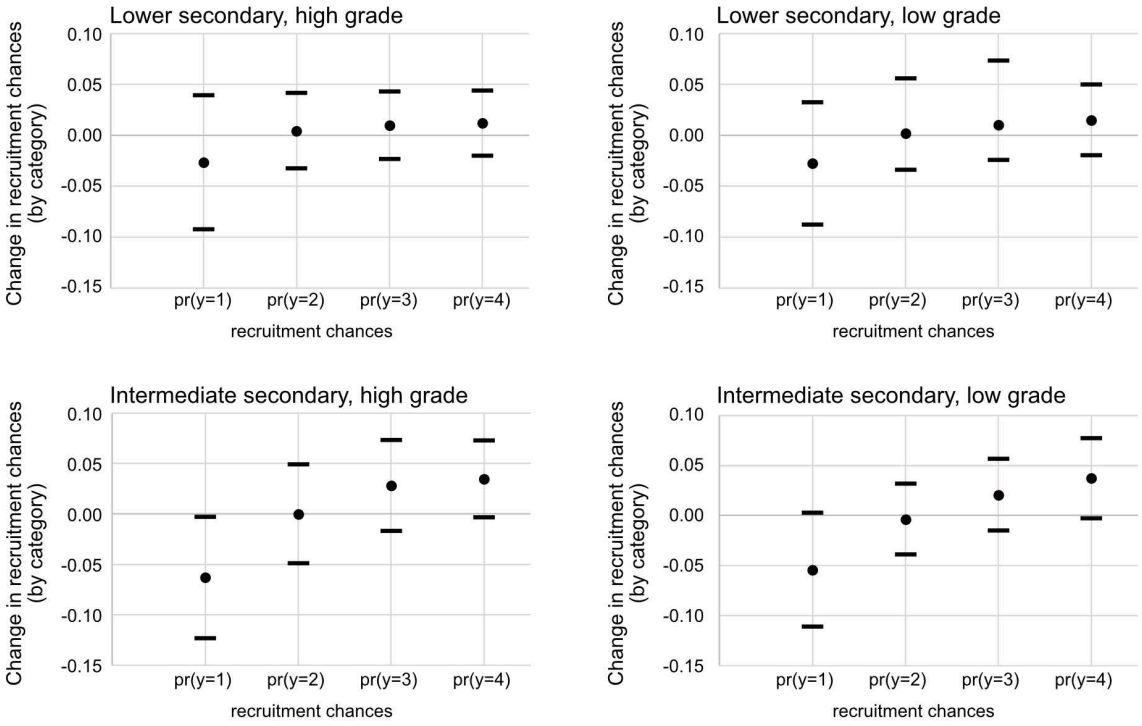
Interaction terms

To analyse whether financial or non-financial support may have a more positive impact for the applicants with the lowest cognitive or non-cognitive skills, we extend the full model from Table 1 by including, in separate models, interaction terms between the applicant's skills and the ALMPs.

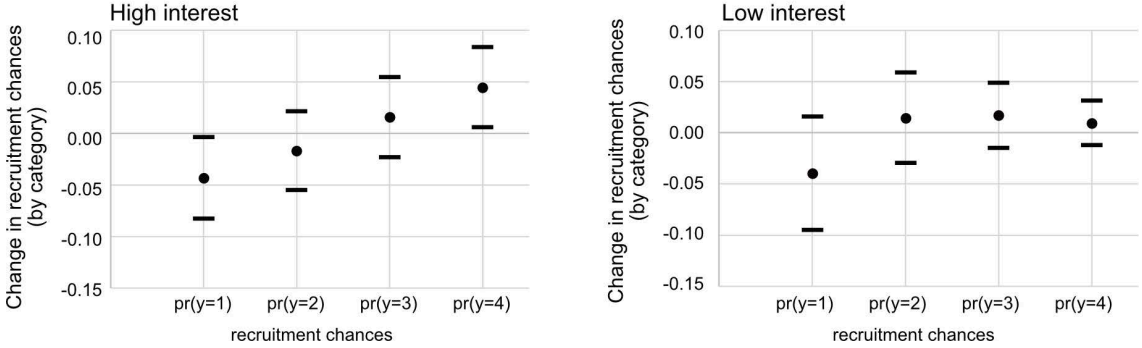
Figure 2 and Figure S1 show the difference between the predicted probability of the four categories of applicants' chances in case of no (non-)financial support versus the highest support (100% of gross training allowance or 8 hours of external support) given a high or low value of the interacted skill. Additionally, we include the 95% confidence intervals (see online supplemental material for Figure S1).[8]

Figure 2A-B: Changes in the probability of recruitment if offered a 100% vs. zero subsidy

Panel A: Different general education backgrounds



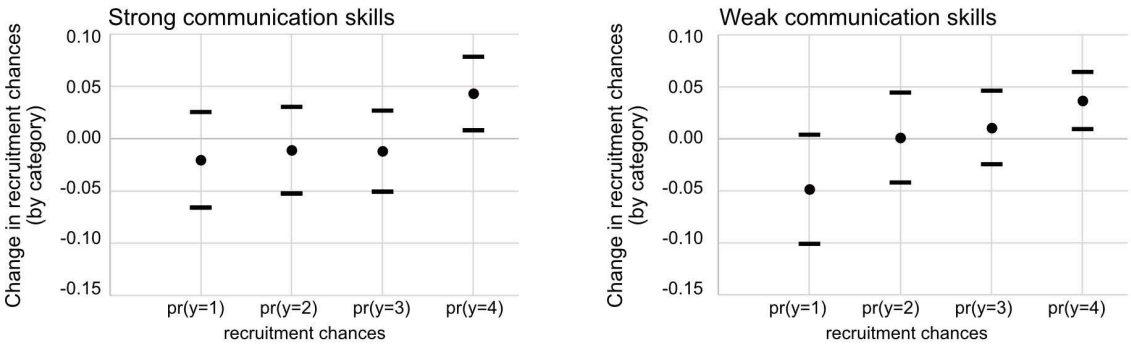
Panel B: High vs. low interest in the vocation



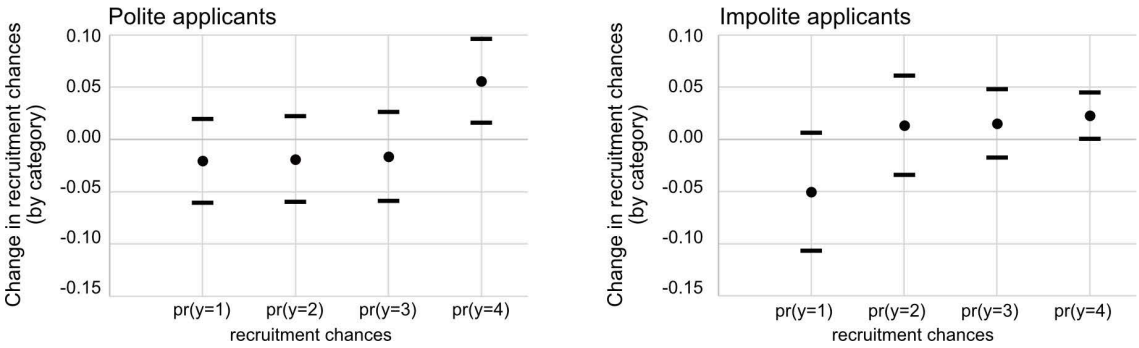
[8] We here focus on the results of the higher support values to reduce the complexity of the presentation. Results for the 50% and the 4-hour support are in line with the presented results and are available from the authors upon request. So are the underlying regression results for the figures.

Figure 2C-D: Changes in the probability of recruitment if offered a 100% vs. zero subsidy

Panel C: Strong vs. weak communication skills



Panel D: Polite vs. impolite applicants



Source: BIBB-CBS 2017/2018; n = 6,599

Financial support: Figure 2A shows the estimation results of the model, including the interaction between the level of general education and the financial support measure. The figure shows that subsidising the full training allowance reduces the probability of a zero-rating for all four general education backgrounds. However, the effect is only significant for applicants with an intermediate secondary diploma. The decreases or increases among the other rating categories are insignificant as well.

Figure 2B shows that for applicants with a high interest in the training vocation, financial support of 100% reduces the probability of a rating in the lowest category by 4 percentage points and increases the probability of receiving a rating within the highest category to the same extent. For those with low interest in the vocation, financial support does not significantly affect the probabilities of recruitment. Hence, the instrument fails to increase chances for applicants with a low interest in the training vocation.

As shown in Figure 2C, financial support of 100% of the training allowance significantly increases the probability of a top-category rating of applicants with weak as well as strong communication skills; for both groups by about 4 percentage points. However, we do not find significant effects for the other recruitment categories.

Figure 2D shows that the effect of financial support is stronger for polite applicants, which would increase the already substantial initial difference between the two groups.

Non-financial support[9]**:** Being offered 8 hours of external support does not change any of the predicted recruitment probabilities for applicants with high and low cognitive skills significantly.

Eight hours of external support also do not result in a significant change in the recruitment probabilities of applicants with high or low interest in the training vocation, strong or weak communication skills, or between applicants who are polite or impolite.

Both ALMPs in the implemented form seems ineffective in increasing firms' willingness to train applicants with low cognitive or non-cognitive skills.

4.4 Robustness analyses

We run three robustness checks.[10] First, we exclude respondents who rate all applicants with a value of zero, as this signals that they are not willing to train any low-skilled apprentices (276 cases). Second, we exclude respondents who recruit apprentices for a vocation with a high share of apprentices with a high school diploma (more than 50 %) as the applicants included in our experiment might lack the necessary skills for these vocations (1.914 cases). Third, we exclude respondents who are not involved in the training decision, as they possibly cannot reliably assess whether the decision-makers in the firm would make the applicants an offer (1,053 cases). In all three robustness analyses, most results for the applicants' characteristics are robust. However, in all models, a financial support of 50 % of the gross training allowance only remains significant for the probability of a rating above zero, but not for a rating in the third or fourth category. The coefficient of the eight hours external support, which was significant at the 10 %-level in the original regressions, remains significant only in the model where respondents with only zero ratings are excluded. Hence, the robustness checks underline our findings that both financial and non-financial support for weaker applicants have only limited potential to increase firms' willingness to train low-skilled youth.

5. Conclusion

As there is evidence that a strong apprenticeship system reduces youth unemployment, politicians seek for solutions to provide as many young people as possible with an apprenticeship and install ALMPs to do so. However, it is often unclear how effective these policies are. In this paper, we use a FSE implemented in the BIBB-CBS 2017/18 to study the impact of low cognitive and/or non-cognitive

[9] Estimation results can be obtained from the corresponding author.
[10] Estimation results can be found in supplementary tables S3 to S5.

skills on firms' recruitment decisions for apprenticeship positions and whether financial or non-financial support could compensate for these low skills.

As in other FSEs, the results are restricted to the specific settings of the experiment. The standard recruitment process usually incorporates multiple stages – from a pre-selection based on written applications to personal interviews and working on a trial basis. Our focus is on applicants who have yet failed to find an apprenticeship and who the firm, in most cases, would probably reject in one of the first selection steps. Hence, our experimental setting frames the selection of low-skilled youth as an additional stage to the standard recruitment process.

To study whether ALMPs could compensate for the low cognitive and non-cognitive skills of the applicants, we use rather strong instruments: a 50-% or 100-% subsidy of apprentices' gross training allowance and 4 or 8 hours of external supervision support per week.

There are four major outcomes of our study. First, both cognitive and non-cognitive skills are of great importance for a firm's decision to offer relatively weak applicants a training position. Second, applicants' non-cognitive abilities have the largest effect on the decision of whether to train weak apprentices. The two strongest predictors for a higher recruiting probability are having a high interest in the vocation and being polite. High non-cognitive skills can thus compensate for low cognitive skills. Third, neither substantial financial nor non-financial support can compensate for a low skill level. However, financial support only increases the probability of being recruited for those who relatively have the best cognitive or non-cognitive skills. Fourth, non-training firms slightly react to non-financial support. This might reflect that they refrain from training low-skilled youth as they are unsure whether they can handle the specific needs of these applicants.

One might wonder why such a large financial subsidy is ineffective as financial support of 100-% of the gross allowance an apprentice receives would enable a firm to train the apprentice at very low or no costs. There are two possible explanations for this finding. First, firms expect the overall training costs of weak applicants to be much higher than the average training costs of the apprentices they are used to recruit. Second, the core of German training firms invest in apprenticeship training to secure their need for skilled workers. The costs of training are therefore of less importance as in the long run the benefits of retaining the apprentices afterwards outweigh the initial training costs. For the low-skilled applicants – especially for those with low cognitive and/or non-cognitive skills – firms might expect that they will not finish the apprenticeship successfully or will not acquire the skills needed to be attractive for the firm as a skilled worker after graduation. Regarding the non-financial support, the same arguments hold. Additionally, the eligibility for an ALMP might be seen as an additional signal for the applicants' low productivity.

Deadweight losses are a widely discussed issue when granting ALMPs, since it is always questionable whether the desired result would not have occurred even without the measure. This is also the case with firms' decision to train low-skilled youth: the extent to which a subsidy is decisive for a company's decision to train a low-skilled young person seems debatable. By design, the scenario in our experiment prevents deadweight losses, as the application timing clearly implies that the young person would be recruited as an additional apprentice. Our analyses show that an ALMP introducing financial or non-financial support to recruit low-skilled youth does not affect the most firms' decision to train an additional apprentice. The effects we found were small and remained insignificant in most cases. This suggests that the effectiveness of ALMPs meant to (re-)integrate low-skilled youngsters early in their working careers is low. This is particularly remarkable given the substantial volume of support and raises the question of whether the subsidy form is suitable for companies, or what other kind of support companies would require instead. Further research might therefore focus on identifying firms' needs for support more closely to motivate them to train specific vulnerable groups.

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List of abbreviations:

ALMPs: Active labour market programs; BIBB: German Federal Institute for Vocational Education and Training; BIBB-CBS: BIBB-Cost-Benefit Survey; CAPI: Computer assisted personal interviews; BA: German Federal Employment Agency; FSE: Factorial survey experiment; SDR: Supply demand ratio.

Availability of data and materials

The BIBB-CBS 2017/18 is available at the Research Data Centre at BIBB (BIBB-FDZ). (doi:10.7803/370.18.1.2.10; https://www.bibb.de/de/1381.php). However, the FSE and some other variables used in the analysis are not included in this data set. They are available from the corresponding author (wenzelmann@bibb.de) on reasonable request.

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Appendix

Table S1: Introduction to the vignettes, question wording and vignette design

Now we focus on apprenticeship training in vocation *XY*. Please imagine – independent from your actual training participation – the following situation: An adolescent (male or female) introduces himself and applies for an apprenticeship position in the vocation *XY*. The gender should not mater in this set up. Hence, for simplification, we use only the male form here. The adolescent is 19 years old, of German citizenship and he has unsuccessfully tried to find an apprenticeship position in the current training year (2017/18). From his application documents and a talk, you receive additional information on achievements in general education, social competences and his interest in the vocation. There might be a financial support for the apprenticeship position linked to the training allowance. As well, there might be a support of an external consultant, which is free of charge. The consultant provides support in all belongings of the firm concerning the apprenticeship and to the apprentice concerning problems in school, with the vocation or in social affairs. Please rate in the following six situations whether your firm would offer the applicant an apprenticeship position. Please rate the applicants independently from each other.

Question: How likely is it, that your firm would offer this applicant an apprenticeship position in vocation *XY*?

Very unlikely 1-2-3-4-5-6-7-8-9-10-11 very likely

Attributes	**Level**	**Text**
Level of general school certificate	1 2	The applicant holds … a lower-secondary diploma an intermediate-secondary diploma
Average grade	1 2	… with an average grade of 2.8. 3.4.
Interest in the vocation	1 2	During the interview he showed … low high … interest in the vocation.
Communication skills	1 2	He has … weak strong … oral and written expression.
Politeness	1 2	His behavior is … impolite polite.
Financial support: **In % of the monthly gross training allowance**	1 2 3	The training position would … not with 50 % of the monthly gross training allowance with 100 % of the monthly gross training allowance … be financially supported.
External non-financial support: **In hours per week**	1 2 3	There is/are … no 4 hours a week 8 hours a week … of external support in the described form.

Table S2: Descriptive Statistics

	mean	sd	min	max	Average rating of candidates
Firm level variables					
Firms' rating of skill shortages	3.85	1.07	1	5	
Training activity					
No activity	0.20	0.40	0	1	2.94
Recent activity	0.80	0.40	0	1	2.99
Firm size					
1 to 9 employees	0.29	0.45	0	1	3.00
10 to 49 employees	0.39	0.49	0	1	2.98
50 to 499 employees	0.26	0.44	0	1	3.00
500 or more employees	0.06	0.24	0	1	2.75
Respondent level variables					
Gender					
Female	0.43	0.50	0	1	2.82
Male	0.57	0.50	0	1	3.10
Educational degree					
VET or less	0.20	0.40	0	1	3.03
Bachelor or Meister	0.39	0.49	0	1	3.21
Academic degree	0.41	0.49	0	1	2.73
Tenure in years	14.30	10.68	0	50	
Respondent's authority to decide in training issues					
"I decide alone"	0.27	0.44	0	1	3.31
"I decide together with others"	0.57	0.49	0	1	2.92
"I support or advice the decision"	0.12	0.33	0	1	2.64
"I'm not part of the decision"	0.04	0.19	0	1	2.68
Contextual variables					
Overall share of apprentices with 'Abitur' in vocation (in %)	34.84	24.34	2.78	88.97	
Regional supply-demand ratio 2017	94.18	7.16	76.35	118.38	

Source: BIBB-CBS 2017/18

Table S3: Generalised logistic regression models on changes in recruitment chances (by category); training and non-training firms

		Training firms			Non-training firms		
		> 1	**> 2**	**> 3**	**> 1**	**> 2**	**> 3**
Applicant characteristics							
General schooling & average grade (base: lower secondary degree; high grade)	lower level with low grade	0.299***			0,042		
		0,071			0,144		
	Intermediate level with high grade	0.611***	0.518***	0.302***	-0,001		
		0,083	0,084	0,108	0,134		
	intermediate level with low grade	0.633***			0.278**		
		0,072			0,125		
Interest in the vocation (base: low interest)	High interest	1.346***	1.870***	1.959***	1.300***	1.893***	2.170***
		0,065	0,081	0,129	0,136	0,175	0,268
Communication skills (base: weak skills)	Strong skills	0.651***	0.783***	0.938***	0.507***	0.629***	1.141***
		0,061	0,067	0,094	0,115	0,138	0,217
Politeness (base: impolite)	Polite	1.508***	1.883***	1.938***	1.331***	1.780***	1.858***
		0,069	0,082	0,131	0,134	0,164	0,249
Financial support (in % of average monthly allowance; base: 0%)	50%	0.148***			0,125	-0.267*	-0,12
		0,054			0,113	0,137	0,189
	100%	0.215***	0.226***	0.476***	0.208*		
		0,064	0,068	0,091	0,113		
External support (in hours per week; base: 0 hours)	4 hours	0,058			0,042		
		0,057			0,109		
	8 hours	0,048			0.265**		
		0,054			0,113		
Constant		-1.944***	-4.649***	-6.840***	-2,125	-5.611***	-8.116***
		0,576	0,585	0,647	1,374	1,381	1,396
Observations		5304			1295		
Pseudo R^2		0,172			0,158		

Source: BIBB-CBS 2017/18

Stars indicate significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the level of the respondent and reported in the second row. Firm and contextual-level characteristics are not displayed in the table and are equal to the ones displayed in Table 1 (full model).

Table S4: Robustness checks (part I)

		Full Model			Exclude those with all ratings = 0		
		> 1	> 2	> 3	> 1	> 2	> 3
Applicant characteristics							
General schooling & average grade (base: lower secondary degree; high grade)	Lower level with low grade		0.249***			0.262***	
			0,063			0,066	
	Intermediate level with high grade	0.497***	0.406***	0.205**	0.551***	0.418***	0.206**
		0,074	0,075	0,097	0,08	0,078	0,098
	Intermediate level with low grade		0.560***			0.575***	
			0,062			0,065	
Interest in the vocation (base: low interest)	High interest	1.333***	1.853***	1.988***	1.472***	1.886***	1.976***
		0,058	0,073	0,116	0,061	0,074	0,115
Communication skills (base: weak skills)	Strong skills	0.617***	0.738***	0.967***	0.701***	0.748***	0.960***
		0,053	0,06	0,085	0,059	0,061	0,086
Politeness (base: impolite)	Polite	1.469***	1.850***	1.915***	1.633***	1.883***	1.903***
		0,061	0,073	0,115	0,064	0,074	0,115
Financial support (in % of average monthly allowance; base: 0%)	50%		0.114**		0.187***	0.114*	-0,054
			0,048		0,062	0,063	0,08
	100%	0.200***	0.247***	0.442***		0.277***	
		0,057	0,061	0,081		0,052	
External support (in hours per week; base: 0 hours)	4 hours		0,059			0,071	
			0,05			0,053	
	8 hours		0.087*			0.097*	
			0,048			0,051	
Constant		-1.934***	-4.832***	-6.994***	-1.675***	-4.778***	-6.870***
		0,52	0,525	0,572	0,509	0,516	0,559
Observations		6599			6323		
Pseudo R^2		0,164			0,169		

Source: BIBB-CBS 2017/18.

Stars indicate significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the level of the respondent and reported in the second row.

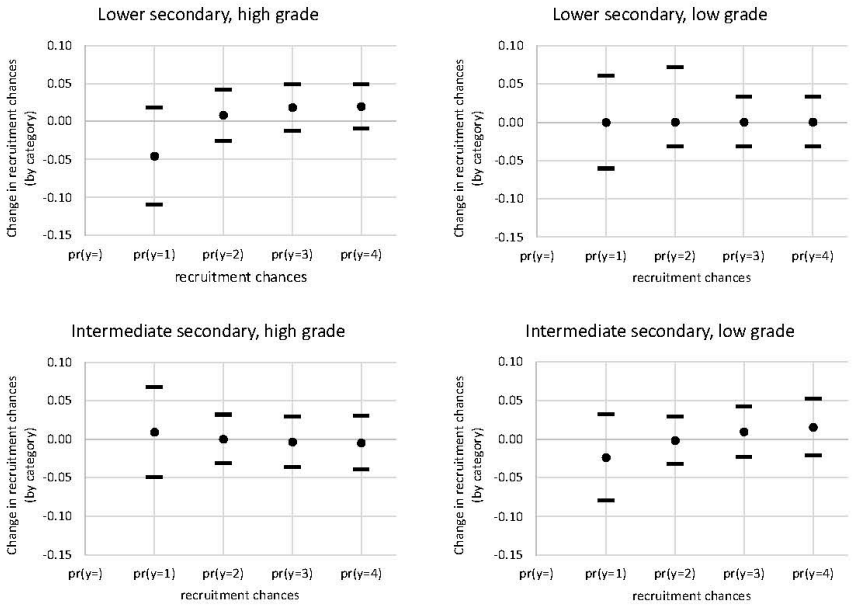
All remaining variables as in the Full Model in Table 1 are included in each estimation as well.

Table S5: Robustness checks (part II)

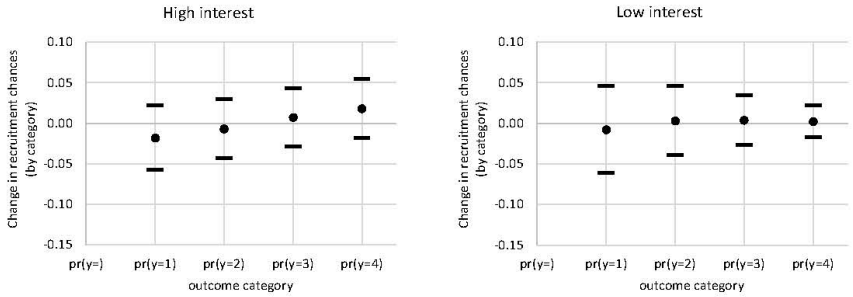
		Exclude vocations with high share (> 50%) of high school graduates			Exclude respondents who do not participate in the training decision		
		> 1	> 2	> 3	> 1	> 2	> 3
Applicant characteristics							
General schooling & average grade (base: lower secondary degree; high grade)	Lower level with low grade	0.200***			0.257***		
		0,076			0,07		
	Intermediate level with high grade	0.281***			0.477***	0.382***	0.206*
		0,075			0,081	0,082	0,105
	Intermediate level with low grade	0.445***			0.494***		
		0,075			0,068		
Interest in the vocation (base: low interest)	High interest	1.403***	1.950***	2.031***	1.390***	1.845***	1.944***
		0,074	0,085	0,126	0,064	0,08	0,124
Communication skills (base: weak skills)	Strong skills	0.686***			0.623***	0.739***	0.925***
		0,055			0,058	0,066	0,091
Politeness (base: impolite)	Polite	1.584***	1.922***	1.936***	1.535***	1.828***	1.875***
		0,078	0,086	0,124	0,067	0,08	0,123
Financial support (in % of average monthly allowance; base: 0%)	50%	0.237***	0.138*	-0,063	0.187***	0,085	-0,083
		0,071	0,072	0,091	0,063	0,066	0,085
	100%	0.279***			0.240***		
		0,059			0,053		
External support (in hours per week; base: 0 hours)	4 hours	0,006			0,049		
		0,06			0,056		
	8 hours	0,062			0,072		
		0,06			0,054		
Constant		-2.260***	-4.852***	-6.881***	-1.373**	-4.363***	-6.479***
		0,622	0,617	0,662	0,567	0,576	0,624
Observations		4685			5546		
Pseudo R^2		0,162			0,163		

Source: BIBB-CBS 2017/18.
Stars indicate significance: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the level of the respondent and reported in the second row.
All remaining variables as in the Full Model in Table 1 are included in each estimation as well.

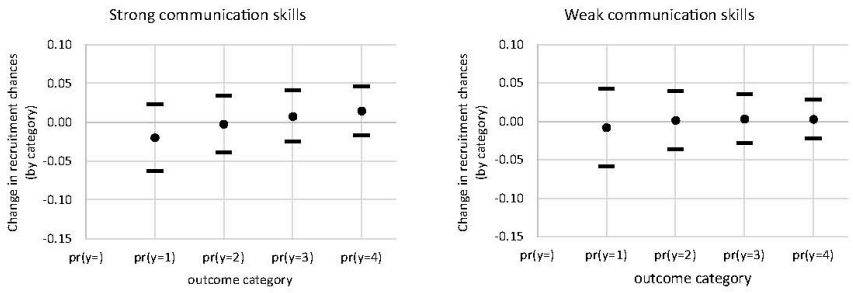
Figure S1: Changes in the probability of recruitment if offered eight vs. zero hours of external support
Panel A: Different general education backgrounds



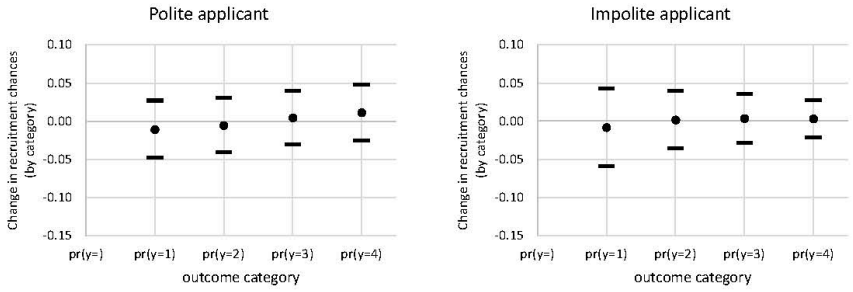
Panel B: High vs. low interest in the vocation



Panel C: Strong vs. weak communication skills



Panel D: Polite vs. impolite applicants



Source: BIBB-CBS 2017 / 2018; n = 6,599