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# ABSTRACT

## The Moderating Role of Job Autonomy in the Relationship Between the Use of Performance Appraisals and Job Satisfaction

We explore the moderating role of job autonomy for the link between the use of performance appraisals and employees' job satisfaction. Results based on German linked employer-employee panel data show that performance appraisals are linked to higher job satisfaction at moderate levels of job autonomy, whereas this positive relationship weakens at both low and high levels of autonomy. Moreover, the interplay between performance appraisals and job autonomy appears sensitive to broader institutional and contextual factors, such as the existence of employee representation, perceived job security, and design of the performance appraisals. Our findings highlight the complex role of job autonomy in shaping employee responses to performance management, underscoring the need for context-aware human resource practices.

**JEL Classification:** M12, M5, J28

**Keywords:** job autonomy, performance appraisals, job satisfaction, German Linked Personnel Panel

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## 1. Introduction

Performance appraisals of employees are used as management practice to set performance incentives, identify training needs, and make promotion or salary decisions (Grubb, 2007). The effects of using performance appraisals in firms are widely discussed in the literature; e.g., employees show higher stress levels but better performance (Kuvaas, 2006; Shvartsman & Beckmann, 2015). Overall, many studies show a positive relationship between the use of performance appraisals and job satisfaction, which is often explained by the fact that employees value the feedback and, in the case of performance-related pay linked to the appraisal, the influence they have on their own salary (e.g., Boon et al., 2014; Kampkötter, 2017). When employees are more satisfied with their performance appraisals, their organizational commitment increases and their intention to leave and absenteeism decrease (Kuvaas, 2006; Brown et al., 2010).

From a firm perspective, the question arises as to whether this assumed relationship is always valid. Some studies examine in more detail the specific situations in which performance appraisals lead to higher job satisfaction. It appears that performance-related pay, clear assessment criteria, employee involvement in the assessment process, good ratings, and appraisals that are perceived by employees as useful, fair, or high quality lead to greater satisfaction (Boswell & Boudreau, 2000; Gabris & Ihrke, 2001; Pettijohn et al., 2001; Brown et al., 2010; Dusterhoff et al., 2014). In addition to these performance appraisal characteristics, some studies also examine the role of the organizational atmosphere. A poor feedback culture, the feeling that appraisers manipulate evaluations, and a poor relationship between appraisers and appraisees lead to employees being more dissatisfied with performance appraisals (Levy & Williams, 2004; Poon, 2004; Pichler, 2012).

The literature also shows a positive relationship between job autonomy and various work outcomes. E.g., greater autonomy is associated with enhanced skill development, increased creativity and innovation, improved health and psychological wellbeing, fewer sick days, stronger organizational commitment, and higher performance (Gagné & Deci, 2005; Gallie, 2013; Ng & Feldman, 2014; Orth & Volmer, 2017; Wheatley, 2017; Grund & Rubin, 2021; Clausen et al., 2021). In addition, several studies demonstrate a positive relationship between job autonomy and job satisfaction (e.g. Garrido et al., 2005; Hytti et al., 2013; Lauring & Kubovcikova, 2022). Descriptive statistics show that around 60% of employees in Europe report having job autonomy over their work pace and rhythm, task sequencing, or working

methods, respectively (Federal Statistical Office Germany, 2022a). However, to our knowledge, little research has been conducted on how given working conditions, such as autonomy, affect the performance appraisal satisfaction link.

We argue that the use of performance appraisals and employees' job autonomy are not solely independently related to jobs satisfaction, but can interact. We therefore study the role of perceived job autonomy in the relationship between the use of performance appraisals and employee job satisfaction. Job autonomy has become increasingly important and widespread in recent years, particularly due to the COVID-19 pandemic and the rapid advancement of digitalization (Eurofound, 2022). Following Hackman & Oldham (1976), we use the term *job autonomy* to refer to the degree of freedom and independence that employees perceive to have in performing their work tasks, e.g., in choosing work methods, scheduling their time, or determining the order in which tasks are performed.[1]

The remainder of this contribution is structured as follows: Section 2 contains theoretical considerations on the investigated relationship. We present our data set and our estimation strategy in Section 3. In Section 4, we present our results and Section 5 concludes.

## 2. Theoretical Considerations

First, there are supposed direct effects of (i) the use of performance appraisals and (ii) job autonomy on employees' job satisfaction. We expect a positive relationship between the use of performance appraisals and employee job satisfaction. This is because performance appraisals can offer feedback, recognition and development perspectives. In addition, performance appraisals often make goals clear and measurable, which increases goal commitment and the perceived meaning of work (*Goal-Setting Theory* according to Locke & Latham, 1990). We also expect a positive relationship between autonomy and satisfaction. Autonomy is a fundamental psychological need (*Self-Determination Theory* according to Deci & Ryan, 1985)

[1] Other terms such as *job control* or *job empowerment* often appear in the literature, sometimes with similar meanings. However, *job control* is usually defined as the "extent to which an employee is able to exert influence over their work environment" (Karasek, 1979) and is therefore a broader term, as it also includes influences on working conditions, e.g. *Job empowerment* is ambiguously defined (Honold, 1997). Basically, it is a psychological concept that describes how empowered and motivated employees feel to perform their work effectively. According to Spreitzer (1995), "psychological empowerment is defined as intrinsic task motivation manifested in four cognitions: meaning, competence, self-determination, and impact." It can therefore include autonomy, but also subjective perceptions. Employee empowerment is sometimes equated with employee participation, although the latter refers more to the extent to which employees participate in work-related decisions. In this study, we use the narrower term *job autonomy*.

and strengthens the feeling of responsibility for work results (*Job Characteristics Model* according to Hackman & Oldham, 1976).

Next to the separate relationships with job satisfaction, an interaction effect between the use of performance appraisals and the degree of job autonomy can be meaningful. Several non-uniform arguments can apply. First, a positive moderating effect of job autonomy for the link between the use of performance appraisals and jobs satisfaction can be presumed. This assumption is supported by several theoretical frameworks, all of which share the basic idea that job autonomy influences how employees perceive external work demands such as performance appraisals - whether they experience them as supportive or controlling, fair or biased, and manageable or stressful.

According to *Self-Determination Theory* (Deci & Ryan, 1985), motivation for a particular behavior depends on the extent to which the three basic psychological needs for competence, social inclusion, and autonomy are satisfied. In a context of high job autonomy, performance appraisals are more likely to be perceived as informative and supportive, reinforcing feelings of competence and fostering intrinsic motivation. Employees in autonomous work environments typically have greater freedom to decide how to pursue performance goals or meet performance expectations. This self-determination allows them to approach their tasks in a way that aligns with their personal working style, which fosters a stronger sense of responsibility for performance outcomes. As a result, employees are likely to respond more positively to performance appraisals, perceiving them as a reflection of their own effort. In addition, the self-determination experienced by employees can foster the perception that their supervisor trusts them and values their competence, further enhancing satisfaction with the appraisal process. In contrast, when autonomy is low, appraisals may be experienced as controlling and externally imposed, which can undermine motivation and reduce job satisfaction. *Control Theory* (Thibaut & Walker, 1975) further explains that individuals perceive procedures as fairer when they feel they have some control over the process. Employees with high job autonomy may perceive greater influence over both how they work and how their performance is evaluated, leading to increased perceptions of procedural fairness and ultimately to greater satisfaction with the appraisal process.

In addition, the *Job Demands-Resources Model* (Bakker & Demerouti, 2007) states that job resources such as autonomy help employees cope with job demands such as performance

monitoring. Autonomy acts as a buffer that mitigates the negative impact of such demands, reducing strain and promoting well-being. Employees with greater job autonomy are thus better equipped to integrate performance appraisals into their work experience in a constructive and less stressful way. Moreover, job autonomy enables employees to tailor their work to their individual needs and preferences, which can also lead to a lower stress experience. E.g., de Clercq and Brieger (2022) found that female employees with higher autonomy were better able to balance work and private responsibilities. Such flexibility helps maintain stable performance levels even in the face of unexpected private demands, which can make performance appraisals feel more satisfying than when rigid structures prevent adaptive responses.

Taken together, these theories suggest that job autonomy shapes how employees interpret and react to performance appraisals. High autonomy supports intrinsic motivation, enhances perceived fairness, and buffers stress, all of which contribute to a more positive evaluation of the appraisal process and in consequence to higher overall job satisfaction.

On the other hand, it is also conceivable that job autonomy plays a negative moderating role, i.e., that the relationship between the use of performance appraisals and employee satisfaction is weakened when autonomy is higher. Employees may feel left on their own when granted a high degree of autonomy in meeting performance expectations. This can evoke anxiety and a sense of being overwhelmed - especially if the appraisal is career-relevant or if employees lacks confidence in their own competence. This would then lead to lower satisfaction compared to a situation where the employee has less autonomy but receives more instructions and guidelines on how to deal with the performance appraisal. Kacmar et al. (2003) also show that frequent communication with the supervisor usually leads to the best performance rating. With high job autonomy, there may be a lack of communication and feedback from the supervisor respectively evaluator during the performance period. This may cause supervisors to make mistakes in the performance ratings because they tend not to monitor the employee's work or discuss it with them. As a result, the performance appraisal process may be perceived as non-transparent by the employee, which reduces satisfaction. According to Brown et al. (2010), employees are indeed more dissatisfied when they have a low-quality performance appraisal experience.

According to *Ego Depletion Theory* (Muraven & Baumeister, 2000), self-control, such as suppressing emotions or maintaining concentration, functions like a muscle: it is a limited resource that is depleted through excessive use. According to the theory and several case studies

(e.g., Muraven et al., 1998), a prolonged period of self-control entails cognitive effort and impairs subsequent performance.[2] Very high levels of job autonomy require employees to constantly self-regulate, since they independently have to make decisions and manage their workflow. This can lead to cognitive fatigue and reduced capacity to cope with additional demands. As a result, the upcoming performance appraisal may be perceived as yet another source of pressure, negatively affecting job satisfaction. Conversely, when job autonomy is very low, employees rarely engage in self-regulated action and their self-control "muscle" remains underdeveloped. In this situation, employees might perceive performance appraisals as disconnected from their own effort, leading to frustration and lower satisfaction. From the above perspective, moderate levels of autonomy may be optimal for fostering satisfaction with performance appraisals: they promote a manageable level of self-regulatory activity, helping employees stay mentally fit without becoming overwhelmed.

Since there are arguments for both a positive and negative moderation of job autonomy in the relationship between the use of performance appraisals and job satisfaction, we do not formulate any a priori hypotheses. It is an empirical question which of the aforementioned explanatory channels predominate. Besides, single arguments can be relevant at a certain range of autonomy values as argued above. In consequence, the aggregated effect needs not to be linear, but a curve-linear interaction effect can also apply.

## 3. Method

### 3.1. Data Set

We use the German Linked Personnel Panel (LPP) provided by the Institute for Employment Research Germany (IAB). The LPP is a linked employer-employee data set that provides a simultaneous view of the employer and employee perspective (Ruf et al., 2022a). Between 2012 and 2020, approximately 1,000 private-sector firms with at least 50 employees in Germany and a total of approximately 7,000 of their employees were biennially surveyed on human resource management topics (Ruf et al., 2022b). Since the same firms and individuals were surveyed in many cases, longitudinal analyses are possible. The LPP can be linked to the IAB Establishment Panel, which is a representative annual employer survey of around 16,000 German firms (Bellmann et al., 2022). The sample for the IAB Establishment Panel is drawn from the establishment database of the Federal Employment Agency in Germany. To achieve

[2] It should be noted that a relatively recent meta-analysis concludes that there is little empirical evidence for *Ego Depletion Theory* (Carter et al., 2015).

representation across industries and firm sizes, the sample is drawn using a disproportionately stratified sampling approach, taking into account sector, firm size, and federal state. For the LPP, random samples are selected from the IAB Establishment Panel, also stratified by sector, firm size, and region. Agricultural businesses and non-profit organizations are excluded. The survey focuses exclusively on employed blue- and white-collar workers, omitting civil servants, the self-employed, freelancers, and family workers. Importantly, individuals are only surveyed as long as they remain with the same employer, so repeated observations refer to the same firm over time (Ruf et al., 2022b).

We analyze at the individual employee level. We use the second to fourth waves of the LPP survey, i.e., the years 2014, 2016, and 2018. In 2012, employees in the LPP were not asked about performance appraisals. The year 2020 is excluded from the analysis due to the exceptional circumstances caused by the COVID-19 pandemic. During this period, many employees were required to work from home as part of public health measures, which often resulted in a sudden increase in autonomy. However, this form of autonomy was not necessarily reflective of actual decision-making freedom, but rather a situational adaptation to crisis conditions. Including this year could therefore lead to bias in the analysis by conflating genuine autonomy with temporary, context-driven changes in work arrangements.

We impose some restrictions on the data set. Our analysis focuses exclusively on full-time employees who have at least 35 contractually agreed weekly working hours and actually work a positive number of hours per week, because perceptions and experiences of job autonomy can differ systematically between full-time and part-time employees. The latter often face less presence at the workplace and different work structures, which can affect both their access to autonomy and their perception of it. For instance, lower job autonomy may be less relevant or less problematic for part-time employees, who may prioritize autonomy during their non-working time over autonomy at work. Full-time employees, on the other hand, generally have a more standardized work structure and comparable requirements. To ensure conceptual clarity and comparability of the results, the sample is therefore limited to full-time employees. Furthermore, we only consider employees between the ages of 21 and 65. Finally, we exclude observations that have a missing value in a variable we use for our analysis. This results in a final data set with 9,457 person observations and 7,437 different individuals. 24% of these individuals appear in two or three LPP years.

### 3.2. Measures

The dependent variable is *job satisfaction* and is rated by an employee in the corresponding survey year on a scale from 0 to 10, where 0 means "completely dissatisfied" and 10 means "completely satisfied." The independent variable is *performance appraisal*. Employees are asked in the LPP whether their own performance is regularly assessed by a supervisor in a defined procedure. If the employee answers *yes*, the variable *performance appraisal* for that employee takes the value 1 in the corresponding survey year, and 0 otherwise. It is possible that an employee states in one survey year that he or she receives performance appraisals, while other employees in the same firm do not have appraisals. The variable is therefore employee-specific. In our data set, performance appraisals are used in about half of the cases. The average job satisfaction score in our data set is 7.4 with a standard deviation of 1.8, with the average score slightly higher in the group of employees who receive performance appraisals (see Appendix A). The Spearman correlation between *job satisfaction* and the use of *performance appraisal* is 0.1445 ($p < 0.01$).

The moderator variable we are focusing on is *job autonomy*. Employees are asked to indicate their agreement with the statement "The job allows me to make a lot of decisions on my own." Employees can respond with "fully applies," "largely applies," "neutral," "does rather not apply," or "does not apply at all." We group the first two answers into the category "high autonomy" and the last two answers into the category "low autonomy." We interpret the neutral answer as "medium autonomy." The statement comes from the *Work Design Questionnaire* by Morgeson & Humphrey (2006), which is frequently used to measure decision-making job autonomy.[3] Accordingly, our study investigates decision-making autonomy. Given the general wording of the survey item, it is reasonable to assume that respondents in the LPP perceive it as a general measure of job-related autonomy. Most observations in our data set, namely 79%, fall into the high-autonomy group.[4] In our data set, on average, job satisfaction is higher among employees with high autonomy compared to those in the other groups. When comparing the different autonomy levels, performance appraisals are used more frequently in the high-autonomy group and less frequently in the other two groups (see Appendix A). The Spearman correlation between *performance appraisal* and *job autonomy* is 0.0977 ($p < 0.01$) and between

[3] The *Job Diagnostic Survey* by Hackman & Oldham (1975) is also frequently used in research on autonomy measurement and covers the same dimensions of autonomy as the *Work Design Questionnaire* by Morgeson & Humphrey (2006).

[4] We will also repeat our analysis later using the autonomy variable with its original five categories and show that dividing it into three or five categories does not affect the results.

*job satisfaction* and *job autonomy* 0.2250 ($p < 0.01$). Concordantly, the average job satisfaction in the presence of performance appraisals increases with a higher autonomy category (low autonomy: 6.86, medium autonomy: 7.15, and high autonomy: 7.83).

We use several control variables in our analyses. We control for personal characteristics, namely age, gender, education, migration background, and BIG 5 personality traits and for several job-related characteristics, including the employee's functional area, contract type, managerial responsibility, task variety, and job-related concerns. All of these individual aspects have been shown to influence employees' job satisfaction, and most of them have also been found to affect either the use of performance appraisals or the degree of job autonomy (Judge & Mount, 2002; Brown & Heywood, 2005; Gazioglu & Tansel, 2006; Grund & Sliwka, 2009; Lopes et al., 2015; Kampkötter, 2017). Moreover, we control for characteristics of the firm in which the employee works, namely the presence of a collective agreement and a works council, the industry sector, firm size, and the firm's location in either eastern or western Germany. Studies show that those aspects influence employee job satisfaction as well as employee autonomy and the use of performance appraisals (Gazioglu & Tansel, 2006; Grund & Sliwka, 2009; Lopes et al., 2015; Kampkötter, 2017; Van Hoorn, 2018; Eisele & Schneider, 2020; Grund et al., 2020).

In our data set, the average age is 47.2 years, 19.4% are women and 2.3% are foreigners.[5] Most individuals have completed an apprenticeship, work in the production sector, have no job concerns, perform various tasks, and work as non-managers on permanent contracts in a large industrial firm in western Germany that has employee representation. It is striking that managers, persons with diverse tasks, and persons without job security tend to be found in the high autonomy group. There are hardly any major differences in variable characteristics between the two groups of individuals with and without performance appraisals (see Appendix A).

[5] Due to the relatively high relevance of part-time work, around 35% of full-time employees in Germany are female (Federal Statistical Office Germany, 2023). However, as women often work in smaller firms and in the public sector (IAB, 2017), which are not included in the LPP, this explains the lower percentage in our data. In addition, the proportion of foreigners in Germany was 12.6% in 2020 (Federal Statistical Office Germany, 2022b), which is significantly higher than the figure in our data set. The lower proportion could be explained by the fact that people with a migration background tend to participate less in the survey due to language barriers.

### 3.3. Estimation Strategy

We apply panel estimations with individual fixed effects. First, we conduct the basic estimation without the interaction term to confirm the relationship between performance appraisal and job satisfaction:

$$Job\ Satisfaction_{it} = Performance\ Appraisals_{it} * ß + Low\ Autonomy_{it} * \delta + High\ Autonomy_{it} * \theta + x'_{it} * \gamma + a_i + \varepsilon_{it} \quad (1)$$

$i = 1, \dots, N$ represents the different employees and $t = 2014, 2016, 2018$ represents the survey years. $Job\ Satisfaction_{it}$ describes the dependent variable, namely the stated job satisfaction of employee $i$ in year $t$. $Performance\ Appraisals_{it}$ represents the independent variable, namely the use of performance appraisals for employee $i$ in year $t$. Since *job autonomy* is a categorical variable, we omit the reference category "medium autonomy" so that the coefficients of the other two autonomy categories $\delta$ and $\theta$ can be interpreted in relation to the category "medium autonomy." $x$ is a vector that includes the control variables. The estimates of the coefficients β, $\delta$, $\theta$, and γ are based on the within-estimator which uses the ordinary least squares method. $a_i$ represents the unobserved, employee-specific, and time-constant heterogeneity, such as leadership or management culture in the employee's firm, which could influence both the use of performance appraisals and job satisfactions. $\varepsilon_{it}$ captures the error term representing all unobserved heterogeneity that varies across employees and over time.

Fixed effects panel estimations are appropriate for investigating our research question. Panel analyses using fixed effects provide stronger evidence of causal relationships than cross-sectional analyses. Fixed effects models control for time-invariant individual differences among employees that cannot be measured by comparing each person with themselves. This prevents the investigated relationship from being distorted by stable individual characteristics and reduces endogeneity problems arising from omitted variable bias. Using fixed effect estimations, we can thus analyze whether the effect of performance appraisal on job satisfaction changes when job autonomy changes - for the same individual. As an alternative, a random effects model could be used. However, in contrast to the fixed effects model, this assumes that $a_i$ does not correlate with the explanatory variables, which is usually an unrealistic assumption. Although our dependent variable is ordinal rather than metric, it is common practice to treat such variables as continuous when they have a sufficiently high number of response categories, typically ten or more, thus justifying the use of linear estimation methods (Norman, 2010).

Next, we add the interaction term between the moderator variable and the independent variable to the equation from (1):

$$Job\ Satisfaction_{it} = Performance\ Appraisals_{it} * ß + Low\ Autonomy_{it} * \delta + High\ Autonomy_{it} * \theta + \left(Performance\ Appraisals_{it}\ x\ Low\ Autonomy_{it}\right) * \vartheta + \left(Performance\ Appraisals_{it}\ x\ High\ Autonomy_{it}\right) * \tau + x'_{it} * \gamma + a_i + \varepsilon_{it} \quad (2)$$

In (2), the two interaction terms examine the moderating role of autonomy. We investigate the effect of performance appraisals on job satisfaction in situations with little or high autonomy compared to situations with medium autonomy. We choose "medium autonomy" as the reference category, which allows us to interpret the effects for both low and high autonomy symmetrically in comparison to a moderate baseline situation.

We apply clustered robust standard errors at the firm level to account for serial correlation, heteroscedasticity, and firm differences. We also control for the survey year to take time trends into account. There are no issues with multicollinearity or common method bias in our analyses. Robust Hausman tests confirm that the fixed effects model is preferable to the random effects model for our estimations. There is a sufficiently high rate of change in performance appraisal status as well as in job autonomy status for panel subjects; of 1,766 panel individuals, 496 report a change in their performance appraisal status and 425 in their autonomy status.

**4. Results**

Table 1 shows the results of our main estimations. It should be noted that no coefficients are given for gender, the BIG 5 personality traits, vocational education, or eastern Germany, as these variables never changed for any individual during the observation period. The BIG 5 traits are measured once for each person in the LPP and then assumed to be constant. In addition, no person reported a change in the other three variables. Therefore, no within estimation is possible for these four aspects, but they are nevertheless automatically controlled for in the fixed effects model.

**Table 1: Individual Fixed-Effects Panel Esimations on Job Satisfaction – Main Analysis**

| | (1) | (2) |
|---|---|---|
| Performance Appraisal | 0.1120* | 0.4629** |
| | (0.066) | (0.1896) |
| Autonomy (Base: Medium) | | |
| Low Autonomy | -0.3013** | -0.0897 |
| | (0.1461) | (0.1665) |
| High Autonomy | 0.2910*** | 0.4444*** |
| | (0.1045) | (0.1326) |
| Performance Appraisal x Low Autonomy | | -0.5579** |
| | | (0.2784) |
| Performance Appraisal x High Autonomy | | -0.3699* |
| | | (0.1957) |
| Age | -0.1024*** | -0.1033*** |
| | (0.0155) | (0.0154) |
| Foreigner | 0.0706 | 0.2028 |
| | (0.1303) | (0.1434) |
| Functional Area (Base: Production) | | |
| Sales / Marketing | 0.0633 | 0.0511 |
| | (0.1495) | (0.1482) |
| Support & Administrative Functions | 0.0571 | 0.0545 |
| | (0.1263) | (0.1250) |
| Services | 0.0868 | 0.0866 |
| | (0.0928) | (0.0926) |
| Fixed-term | -0.0134 | -0.0232 |
| | (0.2029) | (0.2046) |
| Management Position | 0.0969 | 0.1082 |
| | (0.0982) | (0.0978) |
| Diverse Tasks | 0.0197 | 0.0176 |
| | (0.0989) | (0.0983) |
| Job Security | -0.3434*** | -0.3451*** |
| | (0.0748) | (0.0750) |
| Collective Agreement | 0.1326 | 0.1358 |
| | (0.1695) | (0.1683) |
| Works Council | 0.0103 | 0.0133 |
| | (0.1418) | (0.1344) |
| Industry (Base: Processing Industry) | | |
| Metal, Electrical, Automotive | 0.8757** | 0.9024** |
| | (0.3813) | (0.3695) |
| Commerce, Traffic, Communication | | |
| Financial Services | 1.5559*** | 1.5341*** |
| | (0.4511) | (0.4319) |
| ICT | 2.2721*** | 2.3308*** |
| | (0.4872) | (0.4803) |
| Firm Size (Base: 50-99 Employees) | | |
| 100-249 | 0.0647 | 0.0679 |
| | (0.3054) | (0.3033) |
| 250-499 | 0.0665 | 0.0756 |
| | (0.3868) | (0.3870) |
| 500+ | -0.0891 | -0.0761 |
| | (0.4088) | (0.4099) |
| Year Dummies | yes | yes |
| $R^2$ Within | 0.0599 | 0.0627 |
| # Persons in Sample | 7,437 | 7,437 |

| | | |
|---|---|---|
| # Observations in Sample | 9,547 | 9,547 |
| # Persons with Repeated Survey Participation | 1,766 | 1,766 |
| # Observations of Persons with Repeated Survey Participation | 3,966 | 3,966 |
| # Persons with Variation in Performance Appraisal | 496 | 496 |
| # Persons with Variation in Job Autonomy | 425 | 425 |

Notes: Dependent variable = job satisfaction. Individual fixed effects estimations.
Clustered robust standard errors at firm level in parentheses.
*significant at 10%, **significant at 5%, ***significant at 1%.

The positive significant relationship between the existence of performance appraisals and employee job satisfaction is confirmed in model 1. We also find a significant positive relationship between job autonomy and job satisfaction, which confirms previous research already mentioned above. In model 2, we perform the moderation analysis by adding two interaction terms. The coefficient of *performance appraisal* now indicates the estimated effect of the existence of performance appraisals on job satisfaction in the case of medium job autonomy. According to this, the use of performance appraisals increases an employee's job satisfaction by 0.46 points, which is significant at the 5% level. However, if there is little autonomy, this effect is reduced by 0.56 satisfaction points, which represents a significant difference at the 5% level. The effect described above is also significantly weakened by 0.37 satisfaction points with a significance level of 10% for the case of high autonomy rather than medium autonomy. Autonomy thus moderates the relationship between the use of performance appraisals and job satisfaction in the sense that deviations from the medium level of autonomy in either direction lead to a significant weakening of the aforementioned relationship. If employees have little autonomy, they are likely to perceive performance appraisals in line with the theories outlined above as additional control or restriction, which reduces their satisfaction with them. However, a large degree of autonomy does not seem to be conducive to satisfaction with appraisals, either. If employees have too much autonomy, they may feel rather left alone, which consequently results in lower job satisfaction.

We conduct several robustness tests on our results. First, we repeat our analysis using all five categories of the autonomy variable as well as using four categories of the autonomy variable ("low" and "very low" combined, because only a few responded with "very low"), which can be seen in Table 2. The results remain the same. The three-level autonomy variable already provides an adequate representation of the data, as there are no meaningful differences between the "low" and "very low" categories, nor between the "high" and "very high" categories.

**Table 2: Individual Fixed-Effects Panel on Job Satisfaction – Alternative Estimations**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Performance Appraisal | 0.1065<br>(0.0665) | 0.4670**<br>(0.1895) | 0.1062<br>(0.0667) | 0.4617**<br>(0.1896) |
| Autonomy (Base: Medium) | | | | |
| Very Low Autonomy | -0.4890**<br>(0.2295) | -0.2865<br>(0.2517) | | |
| Low Autonomy | -0.2054<br>(0.1507) | 0.0087<br>(0.1737) | | |
| Very Low & Low Autonomy | | | -0.2920**<br>(0.1458) | -0.0868<br>(0.1658) |
| High Autonomy | 0.2496**<br>(0.1049) | 0.3931***<br>(0.1336) | 0.2474**<br>(0.1054) | 0.3893***<br>(0..1337) |
| Very High Autonomy | 0.4649***<br>(0.1139) | 0.6472***<br>(0.1502) | 0.4639***<br>(0.1144) | 0.6445***<br>(0.1508) |
| Performance Appraisal x Very Low Autonomy | | -0.5666<br>(0.4506) | | |
| Performance Appraisal x Low Autonomy | | -0.5544*<br>(0.3032) | | |
| Performance Appraisal x Very Low & Low Autonomy | | | | -0.5429*<br>(0.2788) |
| Performance Appraisal x High Autonomy | | -0.3502*<br>(0.1941) | | -0.3463*<br>(0.1943) |
| Performance Appraisal x Very High Autonomy | | -0.4340**<br>(0.2180) | | -0.4293**<br>(0.2181) |
| Controls | yes | yes | yes | yes |
| Year Dummies | yes | yes | yes | yes |
| $R^2$ Within | 0.0658 | 0.0688 | 0.0647 | 0.0676 |
| # Persons in Sample | 7,437 | 7,437 | 7,437 | 7,437 |
| # Observations in Sample | 9,547 | 9,547 | 9,547 | 9,547 |
| # Persons with Repeated Survey Participation | 1,766 | 1,766 | 1,766 | 1,766 |
| # Observations of Persons with Repeated Survey Participation | 3,966 | 3,966 | 3,966 | 3,966 |
| # Persons with Variation in Performance Appraisal | 496 | 496 | 496 | 496 |
| # Persons with Variation in Job Autonomy | 930 | 930 | 904 | 904 |

Notes: Dependent variable = job satisfaction. Individual fixed effects estimations. Controls = age, foreigner, functional area, fixed-term, management position, diverse tasks, job security, collective agreement, works council, industry, firm size.
Clustered robust standard errors at firm level in parentheses. Performance appraisal coefficient in model 1 and 3 is just under the 10% significance level (p = 0.1100, p = 0.1120). Mean values of autonomy: very low = 0.0353, low = 0.0755, medium = 0.0992, high = 0.4874, very high = 3026.
*significant at 10%, **significant at 5%, ***significant at 1%.

Second, results may differ across subgroups of employees and employment context. We address possible differences regarding gender and employees in management positions as well as regarding the role of perceived job security, the existence of employment representation at the workplace, and the design of performance appraisals. Previous evidence indicated that men identify more strongly with their professional role and that independence is an important component of status and competence for them (Frame et al., 2010). Performance appraisals may

thus be perceived by men with high autonomy as signal of distrust, and by men with low autonomy as an additional act of control. Status and autonomy may be less important to women, who place more value on social support, communication, and feedback (Lizzio et al., 2003). Gender specific estimations are shown in Table 3. The results hint at the possibility that men perceive the combination of low autonomy and performance appraisals in a more negative way than women. Women may be more likely to rate performance appraisals as helpful or appreciative in cases of low autonomy.

**Table 3: The Role of Gender**

| | **Women** | | **Men** | |
|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** |
| Performance Appraisal | -0.0449 | 0.4038 | 0.1587** | 0.4999** |
| | (0.1710) | (0.4493) | (0.0725) | (0.2090) |
| Autonomy (Base: Medium) | | | | |
| Low Autonomy | -0.1799 | -0.1495 | -0.3612** | -0.0998 |
| | (0.2981) | (0.3585) | (0.1639) | (0.1877) |
| High Autonomy | 0.4380 | 0.6753* | 0.2375** | 0.3772*** |
| | (0.2740) | (0.3577) | (0.1066) | (0.1348) |
| Performance Appraisal x Low Autonomy | | -0.1384 | | -0.7213** |
| | | (0.5243) | | (0.3205) |
| Performance Appraisal x High Autonomy | | -0.5537 | | -0.3379 |
| | | (0.4754) | | (0.2120) |
| Controls | yes | yes | yes | yes |
| Year Dummies | yes | yes | yes | yes |
| $R^2$ Within | 0.1457 | 0.1503 | 0.0510 | 0.0551 |
| # Persons in Sample | 1,549 | 1,549 | 5,888 | 5,888 |
| # Observations in Sample | 1,852 | 1,852 | 7,695 | 7,695 |
| # Persons with Repeated Survey Participation | 327 | 327 | 1,439 | 1,439 |
| # Observations of Persons with Repeated Survey Participation | 720 | 720 | 3,246 | 3,246 |
| # Persons with Variation in Performance Appraisal | 91 | 91 | 405 | 405 |
| # Persons with Variation in Job Autonomy | 94 | 94 | 331 | 331 |

Notes: Dependent variable = job satisfaction. Individual fixed effects estimations. Controls = age, foreigner, functional area, fixed-term, management position, diverse tasks, job security, collective agreement, works council, industry, firm size. Clustered robust standard errors at firm level in parentheses.
*significant at 10%, **significant at 5%, ***significant at 1%.

Managers generally have greater freedom to act and face higher expectations in terms of autonomy, which could cause them to perceive and evaluate performance appraisals differently. When managers have a high degree of autonomy, they may perceive performance appraisals more strongly than non-managers as an unwelcome intrusion into their independent decision-making. Conversely, when their autonomy is low, they may experience appraisals as especially controlling and restrictive, perhaps even more so than non-managers. However, results from

these two subgroup analyses show that the (moderating) effect of autonomy is comparable between managers and non-managers.[6]

We expect that the interaction effect between the use of performance appraisals and job autonomy is particularly pronounced among employees who do not experience job insecurity, as they are more likely to interpret low autonomy combined with external control as demotivating and trust-reducing. In contrast, employees facing job insecurity may perceive structured guidance and oversight, such as performance appraisals, as a source of reassurance and stability, even in the absence of autonomy. We therefore provide separate estimations for employees with and without perceived job insecurity. Results reported in Table 4 support this assumption: While especially the interaction term between performance appraisal and low autonomy is strongly negative for employees without job concerns (model 4), the interaction is near zero for those with job concerns (model 2).

**Table 4: The Role of Perceived Job Security**

| | **Job Security** | | **No Job Security** | |
|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** |
| Performance Appraisal | 0.1105<br>(0.1591) | 0.3525<br>(0.3924) | 0.1370*<br>(0.0821) | 0.7006**<br>(0.2821) |
| Autonomy (Base: Medium) | | | | |
| Low Autonomy | -0.0483<br>(0.2860) | -0.0780<br>(0.3608) | -0.1399<br>(0.2162) | 0.3078<br>(0.2199) |
| High Autonomy | 0.2730<br>(0.2273) | 0.3990<br>(0.2819) | 0.3426**<br>(0.1540) | 0.6028***<br>(0.1970) |
| Performance Appraisal x Low Autonomy | | 0.0000<br>(0.4413) | | -1.1659***<br>(0.4049) |
| Performance Appraisal x High Autonomy | | -0.3250<br>(0.4147) | | -0.5627**<br>(0.2783) |
| Controls | yes | yes | yes | yes |
| Year Dummies | yes | yes | yes | yes |
| $R^2$ Within | 0.0586 | 0.0611 | 0.0509 | 0.1503 |
| # Persons in Sample | 2,746 | 2,746 | 5,085 | 5,085 |
| # Observations in Sample | 3,207 | 3,207 | 6,340 | 6,340 |
| # Persons with Repeated Survey Participation | 395 | 395 | 1,031 | 1,031 |
| # Observations of Persons with Repeated Survey Participation | 856 | 856 | 2,286 | 2,286 |
| # Persons with Variation in Performance Appraisal | 106 | 106 | 296 | 296 |
| # Persons with Variation in Job Autonomy | 105 | 105 | 216 | 216 |

Notes: Dependent variable = job satisfaction. Individual fixed effects estimations. Controls = age, foreigner, functional area, fixed-term, management position, diverse tasks, job security, collective agreement, works council, industry, firm size. Clustered robust standard errors at firm level in parentheses.
*significant at 10%, **significant at 5%, ***significant at 1%.

[6] Results are available from the authors upon request.

The interaction effect between job autonomy and the use of performance appraisals on job satisfaction may differ depending on whether a works council is present. Works councils play a central role as employee representatives in the use (Grund et al., 2020) and design of performance appraisals (Section 94 of the German Works Constitution Act). It is expected that performance appraisal processes in a firm with a works council are adapted according to employee preferences. In general, employee voice, e.g. through representation by a works council, leads to employees being more satisfied with performance appraisals (Korsgaard & Roberson, 1995). In firms without a works council, performance appraisals might be perceived as more hierarchical and top-down, especially when job autonomy is low. Under these conditions, employees may experience appraisals as externally imposed controls, which reduces satisfaction. On the contrary, in firms with a works council, employees may perceive performance appraisals as more participatory and fair, even when autonomy is limited. This could attenuate the negative effects of low autonomy. Furthermore, in such firms, a high degree of autonomy might be better supported by transparent appraisal criteria and consultative processes, potentially making the combination of high autonomy and performance appraisal less detrimental to satisfaction.

To avoid bias, we only consider individuals whose works council status did not change during the observation period. Works councils are often introduced in response to specific events within a firm, such as a change of ownership (Mohrenweiser et al., 2011) or economic difficulties (Kraft & Lang, 2008; Jirjahn, 2009). Employees are often dissatisfied and have job concerns before the works council is introduced, but after its introduction they are less concerned and report higher levels of satisfaction (Kraft & Lang, 2008; Grund & Schmitt, 2011). If we included workers who changed works councils in the analysis, changes in job satisfaction could not be clearly attributed to the interaction between performance appraisal and autonomy, but would potentially be distorted by structural change in the firm.

Table 5 presents the results separated by works council status. 84% of the employees in the sample work in a firm with a works council. Previous research by Grund et al. (2024) has shown that works councils can positively moderate the relationship between performance appraisals and job satisfaction. Our results complement this perspective by showing that the moderating effect of a works council depends on the level of job autonomy. In firms with a works council, the results are similar to our main base results shown above. This suggests that the presence of a works council does not necessarily lead to more positive perceptions of appraisals in cases of

low or high autonomy. Performance appraisals may be perceived as more formalized, standardized, and less flexible due to works council involvement. Hence, highly autonomous employees might perceive them as external control. Moreover, employees in firms with works councils often have higher expectations for co-determination. If they simultaneously experience low autonomy, this may signal that the works council is ineffective, resulting in lower trust and reduced satisfaction with HR practices. In firms without a works council, the number of observations is smaller, limiting statistical power. Still, a trend is visible: performance appraisals tend to lower job satisfaction, particularly when autonomy is moderate or high. However, when autonomy is low, appraisals are perceived more positively (model 4). In the absence of both strong employee representation and individual decision-making power, structured feedback through appraisals may offer a rare source of clarity and orientation, which can be reassuring and increase satisfaction.

**Table 5: The Role of Works Councils**

| | **Works Council** | | **No Works Council** | |
|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** |
| Performance Appraisal | 0.1745** | 0.5333** | -0.2705** | -0.0749 |
| | (0.0759) | (0.2109) | (0.1252) | (0.3482) |
| Autonomy (Base: Medium) | | | | |
| Low Autonomy | -0.3823** | -0.1150 | -0.0652 | -0.0876 |
| | (0.1668) | (0.1949) | (0.2965) | (0.3269) |
| High Autonomy | 0.2497** | 0.4119*** | 0.3721 | 0.4706 |
| | (0.1166) | (0.1513) | (0.2476) | (0.2953) |
| Performance Appraisal x Low Autonomy | | -0.6413** | | 0.4748 |
| | | (0.3034) | | (0.5809) |
| Performance Appraisal x High Autonomy | | -0.3715* | | -0.2641 |
| | | (0.2198) | | (0.3798) |
| Controls | yes | yes | yes | yes |
| Year Dummies | yes | yes | yes | yes |
| $R^2$ Within | 0.0630 | 0.0665 | 0.0989 | 0.1032 |
| # Persons in Sample | 6,111 | 6,111 | 1,172 | 1,172 |
| # Observations in Sample | 7,912 | 7,912 | 1,496 | 1,496 |
| # Persons with Repeated Survey Participation | 1,434 | 1,434 | 268 | 268 |
| # Observations of Persons with Repeated Survey Participation | 3,235 | 3,235 | 592 | 592 |
| # Persons with Variation in Performance Appraisal | 412 | 412 | 72 | 72 |
| # Persons with Variation in Job Autonomy | 339 | 339 | 65 | 65 |

Notes: Dependent variable = job satisfaction. Individual fixed effects estimations. Controls = age, foreigner, functional area, fixed-term, management position, diverse tasks, job security, collective agreement, works council, industry, firm size. Clustered robust standard errors at firm level in parentheses.
*significant at 10%, **significant at 5%, ***significant at 1%.

Finally, it should be noted that the results may also depend on the specific design of performance appraisals. We use a general indicator for the existence of appraisals and do not have any information about how the actual appraisals turned out or how they are perceived by employees. Assessments perceived as very fair could lead to less negative performance assessment reactions at extreme levels of autonomy, for instance. Detailed information on the content and structure of the performance appraisals, such as whether subjective or objective goals are used, or whether the appraisal is linked to performance-related pay, would have been valuable, but is not available in the LPP data set. However, we use two sources of information from the LPP to define the type of performance appraisals to some extent. First, employees are asked whether their supervisor conducts a performance review with them to discuss target agreements. If this is the case, we assume that this is a kind of feedback meeting and see this as a sign that employees perceive the performance appraisal as understandable and clear. Second, employees are asked whether objectives are clearly communicated by supervisors. This is therefore the subjective assessment of the supervisor by the employee. If employees answer "fully applies" or "largely applies," we assume that that they rate their supervisors well in terms of clarity of specifying objectives in performance appraisals. In Table 6, we now differentiate our results based on whether the performance appraisal is perceived as clearly understandable or not.

The results in Table 6 indicate that when a feedback interview accompanies the appraisal, both low and high autonomy are more negatively associated with appraisal satisfaction (model 2). This may suggest that feedback interviews are perceived less as supportive and more as controlling. Employees with little autonomy may feel even more monitored, while those with high autonomy might experience a mismatch between their expectations for self-guided work and the formal, possibly standardized nature of feedback discussions. Without a formal feedback meeting, appraisals may be seen as less directive and more open to individual interpretation, which could mitigate negative reactions. In addition, the combination of low autonomy and performance appraisals is particularly negatively associated with job satisfaction when objectives are not clearly communicated (model 8). In such cases, employees lack clarity about the criteria by which they are assessed, and limited autonomy further reduces their sense of control, potentially increasing frustration.

**Table 6: The Roles of Target Agreements and Feedback Interviews**

| | Feedback Interview | | No Feedback Interview | | Clarity of Supervisor's Objective Setting (Employee-Rated) | | No Clarity of Supervisor's Objective Setting (Employee-Rated) | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Performance Appraisal | 0.1602 | 0.8906** | -0.0213 | 0.2665 | 0.0653 | 0.5794** | 0.1570 | 0.7666 |
| | (0.1227) | (0.4261) | (0.0981) | (0.2693) | (0.0812) | (0.2741) | (0.2126) | (0.6251) |
| Autonomy (Base: Medium) | | | | | | | | |
| Low Autonomy | -0.8220* | -0.2221 | -0.3051* | -0.2049 | -0.1171 | 0.3031 | -0.6347** | -0.2864 |
| | (0.4549) | (0.7255) | (0.1746) | (0.1845) | (0.2173) | (0.2575) | (0.3109) | (0.3294) |
| High Autonomy | 0.1858 | 0.7529* | 0.2408* | 0.3187** | 0.0727 | 0.3370* | 0.2658 | 0.3811 |
| | (0.2444) | (0.3972) | (0.1371) | (0.1560) | (0.1491) | (0.1877) | (0.2624) | (0.2938) |
| Performance Appraisal x Low Autonomy | | -0.8914 | | -0.4196 | | -0.8866** | | -1.5199* |
| | | (0.7355) | | (0.3737) | | (0.3652) | | (0.7761) |
| Performance Appraisal x High Autonomy | | -0.8130* | | -0.3038 | | -0.5234** | | -0.5946 |
| | | (0.4553) | | (0.2708) | | (0.2656) | | (0.6708) |
| Controls | yes | yes | yes | yes | yes | yes | yes | yes |
| Year Dummies | yes | yes | yes | yes | yes | yes | yes | yes |
| $R^2$ Within | 0.0649 | 0.0730 | 0.0576 | 0.0591 | 0.0485 | 0.0567 | 0.0656 | 0.0766 |
| # Persons in Sample | 2,849 | 2,849 | 4,819 | 4,819 | 4,942 | 4,942 | 3,000 | 3,000 |
| # Observations in Sample | 3,498 | 3,498 | 6,024 | 6,024 | 6,063 | 6,063 | 3,475 | 3,475 |
| # Persons with Repeated Survey Participation | 556 | 556 | 990 | 990 | 957 | 957 | 415 | 415 |
| # Observations of Persons with Repeated Survey Participation | 1,205 | 1,205 | 2,195 | 2,195 | 2,078 | 2,078 | 890 | 890 |
| # Persons with Variation in Performance Appraisal | 157 | 157 | 252 | 252 | 281 | 281 | 92 | 92 |
| # Persons with Variation in Job Autonomy | 98 | 98 | 274 | 274 | 201 | 201 | 114 | 114 |

Notes: Dependent variable = job satisfaction. Individual fixed effects estimations. Controls = age, foreigner, functional area, fixed-term, management position, diverse tasks, job security, collective agreement, works council, industry, firm size.
Clustered robust standard errors at firm level in parentheses. Observation numbers are lower due to some missing data.
*significant at 10%, **significant at 5%, ***significant at 1%.

Lastly, we add the salary of an employee as further control variable. It can influence both job satisfaction and the level of autonomy, as well as the existence of performance appraisals (Sousa-Poza & Sousa-Poza, 2000; Lopes et al., 2015; Kampkötter, 2017). The interaction terms remain negative.[7]

## 5. Conclusion

Our results indicate that the positive link between the use of performance appraisals and employees' job satisfaction is rather relevant for moderate levels of job autonomy than it is for low or high autonomy that weaken this positive relationship. If there is too little autonomy, employees are likely to perceive appraisals as additional control, while if there is too much autonomy, they may feel left on their own to perform their tasks or they may regard appraisals as criticism of their work.

Our findings suggest that human resources managers should use performance appraisals in a context-sensitive manner and that they should be aware of the interplay between work organization and HR practices. We demonstrate this with regard to job satisfaction, which is also linked to (intention to) quit (e.g., Krekel et al., 2019). Similar associations are conceivable in relation to productivity. Neither too much nor too little autonomy leads to better employee responses to appraisals per se. It should be borne in mind that those employee reactions can depend on the type of the performance appraisals, e.g. on its clarity, on individual needs, such as a desire for security, and on organizational conditions, such as co-determination, and that performance appraisals should therefore be adapted accordingly.

Future research building on our study could focus on other countries where autonomy may be viewed differently. In northern and western European countries, employees have more autonomy at work than, for instance, in North America, where the system is more rule-governed, or than in market-oriented eastern European countries (Dobbin & Boychuk, 1999; Lopes et al., 2015), which is why a certain degree of job autonomy could be taken for granted and a restriction of this autonomy could be viewed as more serious. In addition, the personal characteristics of the employee could be examined in more detail. Intrinsic motivation, internal locus of control, or avoidance attachment orientation, e.g., influence whether employees

[7] We do not use the salary information in our main analysis because the LPP asks vaguely about the salary in the last month, which could include irregular bonuses or overtime payments, because there are several missing values here, and because we already control for manage position and the higher remuneration that normally comes with it. Results including salary as control variable are available from the authors upon request.

generally respond positively to autonomy (Dysvik & Kuvaas, 2011; Littman-Ovadia et al., 2013; Stiglbauer, 2017). Moreover, the congruence between the preference for autonomy and the actual level of autonomy influences performance (Jong & Ford, 2020) and therefore probably also general job satisfaction. Olvera & Avellanda (2023), e.g., show that employees under performance incentives in general have a preference for partial job autonomy. Olvera & Avellanda (2023), e.g., show that employees under performance incentives in general have a preference for partial job autonomy. Overall, understanding the interplay between the organization of work and HR practices is crucial for improving outcome variables such as job satisfaction.

**Declaration of Interest Statement:**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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**Data Availability Statement:**

The data that support the findings of this study are available from the Research Data Centre of the German Federal Employment Agency at the Institute for Employment Research. Restrictions apply to the availability of these data, which were used under license for this study. Data are available with the permission of this third party (10.5164/IAB.FDZD.2206.de.v1).

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## Appendices

### Appendix A: Descriptive Statistics for Whole Sample and by Performance Appraisal Status (PA) and Autonomy Category (AUT)

| | Whole Sample (n = 9,547) | | | PA = 0 (n = 4,929) | PA = 1 (n = 4,618) | AUT = Low (n = 1,058) | AUT = Medium (n = 947) | AUT = High (n = 7,542) |
|---|---|---|---|---|---|---|---|---|
| **Variable** | **Mean/Share** | **Min** | **Max** | **Mean/Share** | **Mean/Share** | **Mean/Share** | **Mean/Share** | **Mean/Share** |
| **Main Variables** | | | | | | | | |
| Job Satisfaction (0-10; 0 = Totally Dissatisfied, 10 = Totally Satisfied) | 7.4180 | 0 | 10 | 7.1670 | 7.6860 | 6.4055 | 6.8691 | 7.6290 |
| Performance Appraisal (0 = Not Present, 1 = Present) | 0.4837 | 0 | 1 | 0 | 1 | 0.3752 | 0.4065 | 0.5086 |
| Autonomy Level (0 = Does Not Apply, 1 = Applies) | | | | | | | | |
| Low Autonomy | 0.1108 | 0 | 1 | 0.1341 | 0.0860 | 1 | 0 | 0 |
| Medium Autonomy | 0.0992 | 0 | 1 | 0.1140 | 0.0834 | 0 | 1 | 0 |
| High Autonomy | 0.7900 | 0 | 1 | 0.7519 | 0.8307 | 0 | 0 | 1 |
| **Individual Characteristics** | | | | | | | | |
| Age (in Years) | 47.2188 | 21 | 65 | 47.4735 | 46.9470 | 46.9168 | 46.3231 | 47.3736 |
| Female (0 = Male, 1 = Female) | 0.1940 | 0 | 1 | 0.2151 | 0.1715 | 0.2599 | 0.2049 | 0.1834 |
| Foreigner (0 = German, 1 = Foreigner) | 0.0226 | 0 | 1 | 0.0211 | 0.0243 | 0.0397 | 0.0275 | 0.0196 |
| BIG 5 (1-5; 1 = Does Not Apply at All, 5 = Fully Applies) | | | | | | | | |
| Openness | 3.6421 | 1 | 5 | 3.6145 | 3.6717 | 3.5850 | 3.4996 | 3.6681 |
| Extraversion | 3.6356 | 1 | 5 | 3.6032 | 3.6702 | 3.5348 | 3.4729 | 3.6702 |
| Conscientiousness | 4.3471 | 1.6667 | 5 | 4.3500 | 4.3441 | 4.3513 | 4.2693 | 4.3563 |
| Agreeableness | 4.0277 | 1.6667 | 5 | 4.0148 | 4.0415 | 4.0178 | 3.9863 | 4.0343 |
| Neuroticism | 2.6712 | 1 | 5 | 2.6990 | 2.6415 | 2.8582 | 2.8493 | 2.6226 |
| Vocational Education (0 = Does Not Apply, 1 = Applies) | | | | | | | | |
| Apprenticeship | 0.5275 | 0 | 1 | 0.5873 | 0.4636 | 0.6739 | 0.5892 | 0.4992 |
| None | 0.0156 | 0 | 1 | 0.0168 | 0.0143 | 0.0350 | 0.0000 | 0.0131 |
| Technical School | 0.2202 | 0 | 1 | 0.2019 | 0.2397 | 0.1503 | 0.1985 | 0.2327 |
| University | 0.2322 | 0 | 1 | 0.1897 | 0.2776 | 0.1352 | 0.1922 | 0.2509 |
| Other | 0.0045 | 0 | 1 | 0.0043 | 0.0048 | 0.0000 | 0.0000 | 0.0041 |
| **Job Characteristics** | | | | | | | | |

| | Whole Sample (n = 9,547) | | | PA = 0 (n = 4,929) | PA = 1 (n = 4,618) | AUT = Low (n = 1,058) | AUT = Medium (n = 947) | AUT = High (n = 7,542) |
|---|---|---|---|---|---|---|---|---|
| **Variable** | **Mean/Share** | **Min** | **Max** | **Mean/Share** | **Mean/Share** | **Mean/Share** | **Mean/Share** | **Mean/Share** |
| Functional Area (0 = Does Not Apply, 1 = Applies) | | | | | | | | |
| Production | 0.4583 | 0 | 1 | 0.4788 | 0.4363 | 0.6106 | 0.5037 | 0.4312 |
| Sales / Marketing | 0.1086 | 0 | 1 | 0.0949 | 0.1232 | 0.0699 | 0.0876 | 0.1167 |
| Support & Administrative Functions | 0.1520 | 0 | 1 | 0.1376 | 0.1674 | 0.0945 | 0.1521 | 0.1600 |
| Services | 0.2811 | 0 | 1 | 0.2887 | 0.2731 | 0.2250 | 0.2566 | 0.2921 |
| Fixed-term (0 = Permanent Contract, 1 = Fixed-term Contract) | 0.0302 | 0 | 1 | 0.0312 | 0.0290 | 0.0501 | 0.0264 | 0.0278 |
| Management Position (0 = No Manager, 1 = Manager) | 0.3132 | 0 | 1 | 0.2962 | 0.3313 | 0.1059 | 0.2017 | 0.3563 |
| Diverse Tasks (0 = Monotonous Tasks, 1 = Diverse Tasks) | 0.8550 | 0 | 1 | 0.8251 | 0.8870 | 0.6900 | 0.7328 | 0.8935 |
| Job Security (0 = Present, 1 = Not Present) | 0.3359 | 0 | 1 | 0.3453 | 0.3259 | 0.4338 | 0.3960 | 0.3146 |
| **Firm Characteristics** | | | | | | | | |
| Collective Agreement (0 = Not Present, 1 = Present) | 0.7518 | 0 | 1 | 0.7083 | 0.7982 | 0.7486 | 0.7571 | 0.7515 |
| Works Council (0 = Not Present, 1 = Present) | 0.8359 | 0 | 1 | 0.7866 | 0.8885 | 0.7968 | 0.8501 | 0.8396 |
| Industry (0 = Does Not Apply, 1 = Applies) | | | | | | | | |
| Processing Industry | 0.3121 | 0 | 1 | 0.3297 | 0.2934 | 0.2817 | 0.3337 | 0.3137 |
| Metal, Electrical, Automotive | 0.4475 | 0 | 1 | 0.4129 | 0.4844 | 0.4301 | 0.4498 | 0.4496 |
| Commerce, Traffic, Communication | 0.0865 | 0 | 1 | 0.1002 | 0.0719 | 0.1040 | 0.0845 | 0.0843 |
| Financial Services | 0.1015 | 0 | 1 | 0.0895 | 0.1143 | 0.1257 | 0.0908 | 0.0994 |
| ICT | 0.0524 | 0 | 1 | 0.0678 | 0.0359 | 0.0586 | 0.0412 | 0.0529 |
| Firm Size (0 = Does Not Apply, 1 = Applies) | | | | | | | | |
| 50-99 Employees | 0.1168 | 0 | 1 | 0.1564 | 0.0745 | 0.1229 | 0.1024 | 0.1177 |
| 100-249 Employees | 0.2274 | 0 | 1 | 0.2702 | 0.1817 | 0.2656 | 0.2429 | 0.2201 |
| 250-499 Employees | 0.2228 | 0 | 1 | 0.2252 | 0.2202 | 0.2278 | 0.2228 | 0.2221 |
| 500+ Employees | 0.4330 | 0 | 1 | 0.3481 | 0.5236 | 0.3837 | 0.4319 | 0.4401 |
| East Germany (0 = West Germany, 1 = East Germany) | 0.2720 | 0 | 1 | 0.3218 | 0.2189 | 0.3346 | 0.2936 | 0.2605 |
| **Year** | | | | | | | | |
| 2014 | 0.4110 | 0 | 1 | 0.4118 | 0.4101 | 0.4064 | 0.3897 | 0.4143 |
| 2016 | 0.3321 | 0 | 1 | 0.3299 | 0.3346 | 0.3412 | 0.2862 | 0.3366 |
| 2018 | 0.2568 | 0 | 1 | 0.2583 | 0.2553 | 0.2524 | 0.3242 | 0.2490 |

Notes: Sum of shares for categorical variables does not always add up to 1 due to rounding errors. PA = performance appraisal, AUT = job autonomy.