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The leadership gap between full-time and part-time female employees

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ABSTRACT

Employers interpret high numbers of contractual working hours of part-time employees as a signal for high work engagement, qualifying them for a leadership position. However, signals do not work equally well in all environments. We suggest that the value of a signal depends on corporate culture, being relatively low in companies with strict work regimes where employees are expected to be available and visible. We test this prediction combining data on female employees and their employers. Our analyses show that the positive effect of contractual hours on leadership positions varies systematically with the difference between the contractual working hours of full-time and part-time employees. The smaller the working time difference between a full-time and a part-time employee, the more likely it is that the part-timer is in a leadership position. In addition, the more a firm relies on overtime and requires strict presence at work, the larger is the statistical association between high contractual hours and leadership positions at individual level. In a world where work-life balance is increasingly important, this research provides new insights into the heterogeneity of part-time workers and the design of corporate cultures and policies to create sustainable work environments.

1. Introduction

Part-time work has found its place in European labor markets. Leadership positions, however, remain largely dominated by full-time workers. In Germany, for example, approximately 29 percent of the workforce works part-time; only about eight percent of part-timers are in leadership positions (Eurostat, 2023a). Despite the emphasis on gender equality in society, the landscape of part-time work is still predominantly female: Approximately 80 percent of part-time workers in Germany are women (Eurostat, 2023a) – and this figure has remained roughly the same for the past 10 years. As part-time workers are less likely to hold leadership positions, the high prevalence of part-time work among women contributes to the low number of women in leadership.

This study explores the difference in the probabilities of holding a leadership position between full-time and part-time female employees – what we call the leadership gap. To capture the heterogeneity of part-timers in terms of working hours, we refrain from treating part-time as a binary status and analyze the number of contractual working hours of part-timers on a continuous scale. Since a key characteristic of part-time workers is that they are not always on-site, we examine how the perceived availability and visibility of employees, such as a firm's overtime culture and its work-from-home policies, affect the size of the leadership gap. Two questions arise: On the one hand, part-time employees who aspire to leadership positions need to figure out how many working hours are optimal. On the other hand, employees and employers need to find out which work environments can support part-time leadership. A proposed theoretical framework accommodates the heterogeneous nature of part-time employment and the interpretation of working time arrangements in terms of availability and visibility in the work environment.

Employees not only face a binary choice between part-time and full-time work, but also decide on the number of working hours in their employment contract. Employers observe this choice and can interpret contractual working hours as a signal of work engagement (Beham et al., 2020; McDonald et al., 2009), which is often an essential but unobservable prerequisite for a leadership position (Day, 2000). Employees with a higher number of contractual working hours signal a higher work engagement to their employer, which increases their probability of holding a leadership position. The leadership gap between full-time and part-time employees narrows as the number of contractual working hours of part-timers increases. Consequently, the leadership gap is a function of the working time differences between full-timers and part-timers.

The leadership gap between full-time and part-time employees is neither constant nor stochastic. Instead, we suggest that it depends on

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the work environment. A company's overtime culture and work-from-home policies influence the strength of the negative signal part-time workers send to their employers. If working beyond contractual working hours is common in a firm, the overtime culture is strong. If most employees always work on-site at a company's premises, the work-from-home policies are restricted. In firms with a strong overtime culture or restricted work-from-home policies, employers are used to employees being visible and available, so part-timers are perceived as less engaged in these work environments. Then, part-timers are disadvantaged in their careers when employers base decisions about leadership positions on working hours.

We empirically test these predictions based on German employment data, combining available information on female employees and firms. Since part-time work remains predominantly a feminine phenomenon, the empirical analysis focuses on female employees. We find that lower contractual working hours reduce the probability of women holding leadership positions with supervisory responsibility. The leadership gap is strictly positive; it is a function of the working time differences between female full- and part-timers, and it decreases when female part-timers choose a higher number of contractual working hours. The size of the gap, however, depends on corporate cultures influencing the importance of employee visibility and availability. The leadership gap is comparably small when the proportion of employees working overtime in a firm is low, or when the proportion of average hours worked from home to the average total working time in a firm is high. In short, the leadership gap is minimal when female part-timers choose a high number of contractual working hours and when employers do not expect employees to be available on-site.

Understanding the leadership gap between full-time and part-time employees is critical in times of skill shortages. Optimizing the potential of part-time workers can help organizations fill critical leadership roles. As the face of part-time employment is predominantly female, understanding and addressing the female leadership gap can also help reduce the gender gap in leadership. This is essential if all available talent pools are to be tapped.

Our research makes contributions to three strands of literature. First, we show that the negative effect of part-time work on leadership is a function, not a constant. While previous empirical studies are consistent in controlling for part-time work as a binary category when explaining leadership (Fietze et al., 2011; Huffman & Cohen, 2004; Rosenfeld et al., 1998), different categories of part-time work have been recently introduced to explain gender differences in the promotion to a managerial position (Deschacht, 2017) and perceived promotability (Beham et al., 2020). Both identify low working hours of part-timers to be particularly harmful. In contrast to Deschacht (2017) and Beham et al. (2020), our study explicitly focuses on leadership positions rather than on promotions. Furthermore, instead of simply making a binary distinction between part-time and full-time employment, we generalize part-time arrangements and consider working hours on a continuous scale. This allows us to precisely quantify the leadership gap between full-time and part-time employees. Our operationalization has both advantages and disadvantages: An advantage is that we do not rule out a company's recruitment strategy, which may (or may not) link leadership positions to full-time contractual obligations. The disadvantage is that we cannot identify employees who have reduced their working hours after being promoted to a leadership position explicitly.

Second, we contribute to the discussion on sustainable and inclusive human resource management strategies in a company (Beham et al., 2020; Karlshaus, 2020) that support the career development of part-time employees, using the example of part-time leadership by identifying work environments that foster part-time leadership. Although some rare qualitative studies emphasize workplace presence (Adams, 1995; Bleijenbergh et al., 2016; Lee et al., 2002; Sheridan, 2004) and employee visibility (McDonald et al., 2008) to hinder part-timers' career advancement, Tomlinson et al. (2018, p. 19) call for an investigation of the "conditions […] to further enhance our understanding of flexible careers." We unlock the black box of part-time workers in leadership and develop a theoretical argument relying on signaling theory (Spence, 1973) from economics and findings on the perception of a signal from management (e.g., Connelly et al., 2011) to explain how a firm's emphasis on employee availability and visibility affects the leadership gap between full-time and part-time employees. From an empirical perspective, we demonstrate that the leadership gap function depends on a firm's overtime culture and its work-from-home policies.

Finally, we indirectly contribute to the discussion on the underrepresentation of women in leadership positions (Bark et al., 2016). We suggest that one reason for this is that some women favor shorter working hours. In firms with flexible working arrangements (i.e., a weak overtime culture and widespread work-from-home policies), there should be comparatively more women in leadership positions.

2. Literature and hypotheses

2.1. Part-time work and leadership positions

A little more than eight percent of employees in leadership positions in Germany work part-time (Eurostat, 2023a). And evidence suggests that more and more employees would like to work part-time (Chung & van der Lippe, 2020; Fuchs-Schündeln, 2019) and participate in working time models that can be adapted to different life stages. But the costs of part-time work, including the detrimental impact of part-time work on career opportunities, prevent many would-be part-timers from reducing their working hours.

Three arguments seek to explain why part-timers are less likely to hold leadership positions. First, part-timers have less time to acquire human capital and are less productive (Fietze et al., 2011; Huffman & Cohen, 2004). Second, part-timers are not a random draw of employees, but they may have different preferences for effort at work and intentionally choose jobs without supervisory responsibility (Cabane & Clark, 2015). A third argument, on which we draw in the rest of this paper, is based on the empirical observation that firms are less likely to promote part-timers to leadership positions than full-time employees (Deschacht, 2017; Fietze et al., 2011; Rosenfeld et al., 1998) because they perceive employees with low working hours as "less engaged" (Lane, 2000; McDonald et al., 2009; Tomlinson, 2006), "less motivated" (Anger, 2008; Bossler & Grunau, 2020), "less committed" (Beham et al., 2020; Javdani & McGee, 2019), and "less dedicated" to work and career (Bossler & Grunau, 2020; Pfeifer, 2010).

To develop our theoretical argument, we draw upon signaling theory (Spence, 1973). If information on work engagement is asymmetrically distributed between employers and employees, and if the previously mentioned perceptions of employers on part-time employees hold, leadership in part-time seems rare. In brief, then, employees use high working hours as a signal to their employers, in the sense of Spence (1973), to show that they are engaged and potentially seek a leadership position.

From an employer's perspective, leadership positions require high levels of effort, motivation, and commitment (Day, 2000), achievement motivation (Mumford et al., 2000), and emotional stability (Judge et al., 2009), all of which shape an employee's work engagement. Of course, employers invest in techniques measuring these properties, they often cannot observe all required characteristics of potential leaders. This clearly holds for external candidates applying for a leadership position, but, to some extent, also for internal candidates. Employees can reduce this information asymmetry by sending observable cues to employers that indicate characteristics relevant to leadership positions. To the extent that important leadership characteristics remain unobservable, employers may interpret an employee's contractual working hours as a signal of work engagement and, consequently, as an indicator of leadership qualities and assign her to a leadership position – or not.

If employers interpret an employee's number of contractual hours as a signal of work engagement, part-timers with more contractual hours

are more likely to be in leadership positions with supervisory responsibility. This positive relationship implies that part-time work is not harmful per se. The positive slope of the probability of obtaining a leadership position gradually reduces the leadership gap (i.e., the difference in the probability of obtaining a leadership position between full-timers and part-timers).

Hypothesis 1. The higher the number of contractual working hours of employees, the smaller the leadership gap between full-time and part-time employees.

2.2. Work environment and the leadership gap between full-time and part-time employees

To incorporate the influence of the work environment in our argument, we further rely on signaling theory (Spence, 1973), while also considering the perception of a signal in its environment (Connelly et al., 2011). The number of working hours is a signal, in the sense of Spence (1973), that carries information about work engagement – but the value of the signal varies with the work environment in which the signal is sent. Any given signal has a greater value in a quiet environment than in a noisy one. But what are the environmental characteristics of a firm that influence the degree to which a given signal is observed? We argue that the work environment, in particular an organization's overtime culture and its work-from-home policies, influences employers' interpretation of the number of contractual working hours of part-time employees when allocating leadership positions. Consequently, part-time work is not equally detrimental to leadership in all firms; on the contrary, some work environments support part-time leadership while others do not.

When employers cannot observe employee characteristics directly, they take signals, such as working hours and interpret them instead. In general, for a signal to be effective, a receiver needs to interpret the signal. The same signal, however, can be interpreted differently (Nishii & Wright, 2008; Rynes et al., 1991) because perception depends on the receiver's experience and the signaling environment (Connelly et al., 2011). Consequently, the work environment influences how employers interpret the signal sent by part-time workers when they choose contractual working hours.

We concentrate on two features of the work environment covering visibility and availability of employees in the workplace: a firm's overtime culture and a firm's work-from-home policies. Following Fried (1998, p. 37), we define an overtime culture as "the natural expectation that employees will put in overtime". In a strong firm overtime culture, employees are expected to work more than the number of hours in their contracts; in a weak overtime culture, employees are expected to work only the number of hours in their contract, but no more. Work-from-home policies range from being restricted to widespread. In restricted work-from-home policies, all employees always work on-site at the firm; in widespread work-from-home policies, employers do not expect employees to be present at the workplace on-site, but support working from home. Both work environments are associated with the visibility and availability of employees at work.

Evidence that these cultural aspects matter is abundant. In June 2022, Elon Musk sent emails to SpaceX and Tesla employees, asking them to come back to the office for at least 40 h per week after several months of working from home due to the Covid pandemic (NPR, 2022). Apparently, Musk perceives 40 hours as "normal working time" and seems to believe that present workers are more engaged in their work and have higher output. Elon Musk is not alone in this perception. Interview studies reveal that being present and visible at the workplace is crucial for career advancement in general. A firm's emphasis on excessive working hours harms the career advancement of those employees, both part-time and full-time, who do not work long hours (Nemoto, 2013); firm cultures that emphasize face time (Adams, 1995; Lee et al., 2002), visibility (Bleijenbergh et al., 2016), and presenteeism (Sheridan, 2004) hinder the career advancement of part-time employees.

The extent to which employees conform with corporate cultures and policies matters. The contractual working time is only a signal if it carries information on relevant characteristics of the employee to the firm. This is the case when the employer and the work environment emphasize visibility and availability. Otherwise, working time does not carry any relevant information for the employer and does not serve as a signal in the sense of Spence (1973). If working time does not signal information on leadership skills in a specific context, then employers do not take it as an indicator when staffing leadership positions. A higher number of contractual working hours is a signal of high work engagement, which in turn increases an employee's chances of obtaining a leadership position with supervisory responsibility in certain work environments only: The stronger the overtime culture or the more restrictive the work-from-home policies, the wider the leadership gap between full-timers and part-timers.

Hypothesis 2. In a strong overtime culture, additional contractual working hours of part-timers reduce the leadership gap between full-timers and part-timers.

Hypothesis 3. In restricted work-from-home policies, additional contractual working hours of part-timers reduce the leadership gap between full-timers and part-timers.

3. Methods

Next is a brief description of the data and our sample, followed by an overview of the variables, some descriptive statistics, and an explanation of the statistical method.

3.1. Sample

The empirical test of the predictions relies on German employment data for two reasons. First, all employees in Germany have the legal right to work part-time. Second, in 2022, approximately 8 percent of employees in leadership positions in German firms worked part-time, which is representative of the European Union (Eurostat, 2023a). Thus, testing the predictions with data from Germany allows us to derive evidence from a Western country in which employees are increasingly interested in working reduced hours.

To analyze the relationship between employees' contractual working hours and the holding of leadership positions in different work environments, detailed information is needed on both employees and their employers. We combine data from two different sources on German employees and employers that are provided by the German Institute for Employment Research (IAB), a publicly funded research institute that, among others, provides representative survey data on German establishments.

First, we use the Linked Personnel Panel (LPP) (Ruf et al., 2020a, 2020b), which is representative of German private-sector establishments with more than 50 employees who are subject to social security, encompassing all private-sector industries except agriculture, forestry, and fishing. We use four waves of the LPP dataset that were conducted in 2012/2013, 2014/2015, 2016/2017, and 2018/2019. Both employees and their employers were surveyed, resulting in a linked employer-employee dataset. It provides detailed information on employee socio-demographics, working conditions, and career development at the individual level as well as information on human resource management practices, working arrangements, values, and structural conditions at the establishment level. The second data source is the IAB Establishment Panel (Bellmann et al., 2021; Ellguth et al., 2014), a survey that provides further information on establishments (e.g., establishment's proportion of female employees, firm size, industry indicator). Since the LPP dataset is a follow-up survey of the IAB Establishment Panel, we can link the two datasets using a unique identifier and obtain additional information about the establishments

included in the LPP survey. The final dataset is a combination of the LPP data and the IAB Establishment Panel data. We rely on employees aged 18–67 years, which is the mandatory retirement age in Germany. This sample is used to calculate the firm environment variables.

For the empirical analyses, we focus exclusively on female employees. First, given that almost 80 percent of part-time workers in Germany are women (Eurostat, 2023a), part-time work remains predominantly a female phenomenon. Second, male and female employees may have different priorities regarding work and family, leading them to make different choices regarding their contractual working hours (Brett & Stroh, 2003; Rutherford, 2001). Thus, analyzing only female employees reduces a source of unobserved heterogeneity in the empirical models. And third, the low number of women in leadership positions is a key issue in both academic and societal debate.

The sample includes only individuals with a maximum contractual working time of 48 hours per week in conformity with the German Hours of Work Act (Hours of Work Act, 1994), and individuals with a total working time (including overtime hours) of less than or equal to 80 hours, since extremely long working hours are more likely to be a consequence than a determinant of supervisory responsibility (Wright et al., 1995). We exclude individuals with no formal qualifications and those with a level of education that cannot be attributed to a German degree.[1] Since the signaling effect of contractual working hours can only be observed within the same firm, we focus on employees who continue to work for the same employer for at least two waves. This results in a sample of 769 women working for 343 employers.

To address potential endogeneity concerns, we lag our main independent variable, *contractual working hours*, by one period, so that we lose individual-level observations from the first wave of an individual. Of the 769 women in the final sample, 587 have been in the sample for two waves, 157 for three waves, and 25 for four waves. Therefore, after the lag, we end up with 976 (= 1*587+2*157+3*25) employee observations for the main empirical analyses.

3.2. Measures

To measure the effect of obtaining a leadership position with supervisory responsibility, we operationalize our dependent variable *leadership with supervisory responsibility*$_t$ using the question "Do you supervise others?" The variable takes the value of 1 if the employee supervises other employees in year t and 0 otherwise.

We use *contractual working hours*$_{t-1}$ at individual level as explanatory variable, which is the number of weekly working hours noted in the employment contract. To measure the culture of visibility and availability in a firm, we are developing an overtime culture score and a work-from-home policies score for each establishment. In line with the literature on long-hour work cultures (Zbyszewska, 2012), we construct the explanatory variable firm *overtime culture* as the proportion of employees in a firm who work overtime hours each week – averaged over all periods. This proportion measures the prevalence of overtime work among employees, regardless of the number of overtime hours worked, to ensure that the *overtime culture* at establishment level and *contractual working hours*$_{t-1}$ at individual level are distinct constructs.[2] To measure *work-from-home policies* we use the proportion of the average hours worked from home to the average total working time of a firm – also averaged over all periods. Both measures are time-invariant because it is safe to assume that culture persists over time.

Table 1 summarizes the descriptive statistics and the correlations of the main variables. In our sample, approximately 18.5% of the employees over all years are in a leadership position with supervisory responsibility. Due to our study design, this number is notably above the overall European average (Eurostat, 2023a) for two reasons: first, we only include employees who in fact can obtain a leadership position with supervisory responsibility in their job; second, all employees in our sample have been working for the same employer for at least two periods. Both restrictions increase the probability of a leadership position but at the same time reduce self-selection issues of employees into certain jobs and thus provide conservative estimates for the leadership gap.

The average contractual working time of all female employees over all years (no matter whether they are in a leadership position or not) is 33 hours. Over all firms in the sample, on average 62.9% of their male and female employees work overtime, while on average 1.8% of a firm's total working hours are performed from home.

Several factors influence the probability of obtaining a leadership position with supervisory responsibility and need to be controlled for in an empirical analysis. Following the literature on supervisory responsibility, we control for factors at the individual level, job-related factors, and firm-level characteristics.

Individual-level factors include whether an individual was born in Germany as a measure for ethnicity (Adamovic & Leibbrandt, 2022), age (De Neve et al., 2013), the number of children (Francis, 2017), a dummy variable for having a partner (Metz & Tharenou, 2001), and an employees' highest educational degree (Li et al., 2011). Additionally, we control for employees' self-assessments to capture the Big Five personality traits (Doornenbal et al., 2022), work engagement (Sautier et al., 2015), an individual's level of commitment to the organization, and an employee's willingness to take risks. Job-related factors include participation in training at the workplace (Rothstein, 2001), whether an individual has worked from home during her regular working time in the previous period, and occupational position. To deal with potential hidden full-time employment (i.e., part-time employment combined with overtime), we consider the number of overtime hours worked by an employee in the previous period as a control variable.

Control variables at firm level include dummy variables for whether structural development plans exist, whether appraisal interviews exist, whether an employer offers flexible working hours to retain employees, and whether promotions are based on criteria such as personal competence or professional expertise. Finally, we control for the establishment size, the span of control (Groshen & Krueger, 1990), the establishment's proportion of females (Yaish & Stier, 2009), and industry and regional factors.

3.3. Statistical method

The empirical analysis investigates the leadership gap between full-timers and part-timers in different corporate cultures. We estimate the probability of holding a leadership position with supervisory responsibility depending on contractual working hours using probit models with maximum likelihood (Stock & Watson, 2020, p. 401), as the dependent variable is binary. A one-period lag (Wooldridge, 2019, pp. 336–341) of the working hours variable is applied to exclude the argument that employees already holding leadership positions with supervisory responsibility choose to reduce their working hours. Due to the highly unbalanced panel, we pool the data over all waves and cluster standard errors at the employee level since individuals are more similar to themselves over time than to other individuals (Cameron & Trivedi, 2010, p. 335). To control for time, we include a dummy variable for each survey wave.

The regression equation of model (m1) to estimate the relation between contractual working hours and the probability of holding a leadership position to test hypothesis 1 reads as follows:

$$P(\text{leadership with supervisory responsibility}_{it} = 1|\bullet) = \Phi(\beta_0 + \beta_1 \text{contractual working hours}_{it-1} + \beta_2 \text{overtime culture}_i + \beta_3 \text{work-from-home policies}_i + \gamma \boldsymbol{controls} + \varepsilon_i)$$

[1] These two groups comprise 15 individuals; including them in the analysis does not qualitatively change the results.

[2] The bivariate correlation is small and negative.

Table 1
Descriptive statistics and correlation matrix of the main variables.

	Mean	SD	(1)	(2)	(3)	(4)
(1) Leadership with supervisory responsibility$_t$	0.185	0.389	1.000			
(2) Contractual working hours$_{t-1}$	33.020	7.697	0.188***	1.000		
(3) Overtime culture	0.629	0.211	0.011	−0.087**	1.000	
(4) Work-from-home policies	0.018	0.039	0.001	−0.024	0.171***	1.000

Notes: Descriptive statistics of individual-level variables are based on 976 individual-level observations from 769 employees, descriptive statistics of establishment characteristics (overtime culture and work-from-home policies) are based on 343 establishments, mean and standard deviation of (1) and (2) at employee level and (3) and (4) at firm level, correlations are based on employee-year observations.
Source: Our own calculations based on data from the LPP 2012–2019 and the IAB Establishment Panel 2012–2019.

Φ is the cumulative distribution function of the standard normal distribution. ***controls*** is a vector of all control variables (individual-level, job-related, firm-level) and dummy variables for each survey wave. **γ** is the vector of the estimated coefficients of the control variables. Based on these estimation results, we quantify the leadership gap between full-timers and part-timers for different contractual part-time arrangements to capture the heterogeneous nature of part-time work. We first calculate the predicted probability of each employee in the sample being in a leadership position with supervisory responsibility at different numbers of contractual working hours. We then average the predicted probabilities at each contractual working time, so that we have the average probability of holding a leadership position in the sample at a range of working times. Finally, we compute the difference between the average predicted probabilities for full-time workers and different contractual part-time arrangements. Since the number of contractual working hours of a full-time working week in Germany varies across jobs, firms, and sectors, for comparability and simplicity, we assume 40 hours as full-time employment (which is close to the upper bound). Part-time arrangements in our case exemplary are 5, 10, 15, 20, 25, 30, and 35 hours per week. This difference is the leadership gap between full-time and part-time employees, which varies for different degrees of part-time employment.

To test hypotheses 2 and 3, and to see how the work environment affects the leadership gap, models (m2) and (m3) additionally include an interaction term between lagged contractual working hours and overtime culture (model m2), respectively, work-from-home policies (model m3). The regression equation with interaction reads as follows:

$$P(\text{leadership with supervisory responsibility}_{it} = 1|\bullet) = \Phi(\delta_0 + \delta_1 \text{contractual working hours}_{it-1} + \delta_2 \text{overtime culture}_i + \delta_3 \text{work-from-home policies}_i + \delta_4 \text{contractual working hours}_{it-1} \times \textit{moderator}_i + \psi \textbf{\textit{controls}} + \varepsilon_i)$$

$moderator_i$ is overtime culture in model (m2) and work-from-home policies in model (m3). ψ is the vector of the estimated coefficients of the control variables.

Based on the estimation results of these interaction models, we again calculate the leadership gap for different, previously stated exemplary levels of part-time work, but also consider the full range of different work environments. Specifically, we calculate the difference between the average predicted probabilities of holding supervisory responsibility of full-timers and part-timers at different numbers of contractual working hours (at 5, 10, 15, 20, 25, 30, and 35 h) and at different points in the overtime culture and in the work-from-home policies.

Since endogeneity might be an issue, strictly speaking, we identify a correlation rather than a causal effect. If an employee's working time is a consequence rather than an antecedent of holding a leadership position, simultaneous causality is conceivable. We attempt to mitigate this issue by lagging the main independent variable (contractual working hours) by one period, so that we measure working time in t-1 and holding a leadership position in t. In addition, selection of employees to certain firms and omitted variable bias could be problems. To address this concern, we have included many control variables from the economics and leadership literature at both the individual and the firm level. Nevertheless, we cannot completely rule out this type of endogeneity.

4. Results

In a first step, we test hypothesis 1 stating the leadership gap increases when the difference in contractual working hours between female full-timers and part-timers increases. First, we estimate the effect of contractual working hours on the probability of holding a leadership position with supervisory responsibility (Table 2, model m1). The probit estimations show that employees with additional contractual working hours significantly increase their probability of obtaining a leadership position with supervisory responsibility. Conversely, a decrease in contractual working hours significantly reduces the probability of holding a leadership position with supervisory responsibility.

Second, based on model (m1), we calculate the leadership gap – the difference in the average predicted probabilities of holding supervisory responsibility between full-timers and part-timers. Not surprisingly, row 1 of Table 3 shows that all average predicted probabilities of having a leadership position with supervisory responsibility are statistically different from 0 and increase with an employee's number of contractual working hours. A female full-time employee (in t-1) – assumed to work 40 hours a week – holds a leadership position with supervisory responsibility (in t) with an average predicted probability of 0.251. The corresponding probability for a female part-time employee on a 20-hours contract is 0.077 only. The resulting leadership gap for a female employee on a 20-hours contract thus is 0.175 (rounded). In line with hypothesis 1, the gap is statistically significant and positive and decreases when the difference between full-timers' and part-timers' contractual working hours decreases.

In a second step, we analyze the impact of the work environment on the leadership gap between full-time and part-time female employees. First, we examine firm overtime culture; then, we inspect work-from-home policies. Hypothesis 2 states that if part-time employees increase their contractual working hours, the leadership gap decreases in a strong but not in a weak firm overtime culture. To test this proposition, we analyze whether and how the leadership gap varies in different overtime culture regimes and different degrees of part-time. Technically, the interaction of individual contractual working hours and firm overtime culture is relevant. Model (m2) in Table 2 displays a significant interaction coefficient, already suggesting that the relationship between contractual working hours and the probability of holding a leadership position depends on overtime culture. Based on model (m2) in Table 2, we calculate the leadership gaps at different contractual working hours across different levels of overtime culture which are displayed in Table 4. The results in the rows and the columns reveal two patterns: First, the rows of Table 4 show that the leadership gap increases with higher levels of overtime culture – for each number of contractual working hours. Second, the columns of Table 4 show that the leadership gap decreases with higher contractual working hours of part-timers – independent of the overtime culture. The white cells in Table 4 exhibit combinations of contractual working time and overtime culture that do not lead to a significant leadership gap between full-timers and part-

Table 2
Probit Estimations of holding a leadership position with supervisory responsibility.

	Contractual working hours	Moderation: overtime culture	Moderation: work-from-home policies
	(m1)	(m2)	(m3)
Contractual working hours $_{t-1}$	0.049***	−0.018	0.045***
	(0.010)	(0.027)	(0.011)
Overtime culture	0.016	−3.841***	0.014
	(0.349)	(1.486)	(0.349)
Work-from-home policies	−0.340	−0.299	−4.357
	(1.546)	(1.562)	(5.633)
Contractual working hours $_{t-1}$ × overtime culture		0.109***	
		(0.042)	
Contractual working hours $_{t-1}$ × work-from-home policies			0.121
			(0.174)
Employee characteristics			
Country of birth: Germany (ref.: all other countries)	0.234	0.283	0.228
	(0.300)	(0.295)	(0.299)
Age	0.015**	0.016**	0.015**
	(0.007)	(0.007)	(0.007)
Number of children	−0.178	−0.163	−0.179
	(0.125)	(0.129)	(0.125)
Partner (ref.: no partner)	0.334**	0.317*	0.327*
	(0.170)	(0.171)	(0.170)
Extraversion	0.064	0.086	0.068
	(0.090)	(0.089)	(0.089)
Agreeableness	−0.182*	−0.198*	−0.181*
	(0.108)	(0.110)	(0.109)
Conscientiousness	0.055	0.050	0.051
	(0.149)	(0.149)	(0.149)
Neuroticism	−0.140*	−0.133*	−0.142*
	(0.079)	(0.080)	(0.080)
Openness	−0.070	−0.087	−0.070
	(0.094)	(0.095)	(0.094)
Vigor	−0.154	−0.139	−0.155
	(0.102)	(0.102)	(0.102)
Dedication	0.132	0.125	0.130
	(0.134)	(0.132)	(0.134)
Absorption	0.171	0.172	0.178
	(0.113)	(0.110)	(0.114)
Commitment	0.011	0.012	0.011
	(0.014)	(0.014)	(0.014)
Risk-seeking	0.018	0.020	0.018
	(0.037)	(0.037)	(0.037)
Educational level (ref.: apprenticeship)			
training college	−0.264	−0.265	−0.266
	(0.182)	(0.183)	(0.182)
Technical college	0.025	0.006	0.022
	(0.197)	(0.198)	(0.197)
University degree	0.609***	0.608***	0.619***
	(0.154)	(0.155)	(0.156)
Training at the workplace (ref: no training)	0.328***	0.346***	0.332***
	(0.120)	(0.121)	(0.120)
Occupational position (ref.: unskilled/semi-skilled worker)			
Skilled worker	0.147	0.146	0.145
	(0.268)	(0.266)	(0.268)
White-collar worker	0.130	0.130	0.131
	(0.221)	(0.219)	(0.220)
Overtime hours$_{t-1}$	0.041**	0.043***	0.041**
	(0.016)	(0.016)	(0.016)
Working from home (ref.: not working from home $_{t-1}$)			
Working from home not possible $_{t-1}$	−0.124	−0.130	−0.119
	(0.187)	(0.191)	(0.187)
Working from home $_{t-1}$	0.166	0.162	0.145
	(0.236)	(0.241)	(0.238)
Establishment characteristics			
Development plans (ref: no development plans)	0.002	−0.008	0.004
	(0.126)	(0.126)	(0.126)
Appraisal interviews (ref: no appraisal interviews)	−0.282**	−0.270*	−0.283**
	(0.143)	(0.142)	(0.143)
Flexible working hours	−0.022	−0.022	−0.022
	(0.061)	(0.062)	(0.061)
Promotion based on professional expertise (ref: no)	−0.514	−0.504	−0.512
	(0.335)	(0.318)	(0.333)
Promotion based on personal competence (ref: no)	0.188	0.192	0.187
	(0.213)	(0.212)	(0.213)

(*continued on next page*)

Table 2 (*continued*)

	Contractual working hours	Moderation: overtime culture	Moderation: work-from-home policies
	(m1)	(m2)	(m3)
Establishment size: small and medium-sized Enterprises: 10–249 employees (ref.: large Enterprises: 250 and more employees)	0.130	0.094	0.130
	(0.139)	(0.140)	(0.139)
Establishment's supervisor-to-staff ratio	7.615***	7.306***	7.567***
	(2.762)	(2.770)	(2.758)
Establishment's proportion of females	1.902***	1.942***	1.926***
	(0.369)	(0.366)	(0.371)
Constant	−4.322***	−2.041	−4.187***
	(1.153)	(1.442)	(1.163)
Number of observations	976	976	976
Number of employees	769	769	769
Number of establishments	343	343	343
Pseudo R-squared	0.246	0.252	0.246
Correctly predicted	0.847	0.845	0.848

Notes: Dependent variable: leadership with supervisory responsibility$_t$; dummy variables for survey wave, state (16), and industry (11) included; skilled workers include forewomen; standard errors clustered at employee level in parentheses, *p < 0.10, **p < 0.05, ***p < 0.01.
Source: Our own calculations based on data from the LPP 2012–2019 and the IAB Establishment Panel 2012–2019.

timers. The darker the cells, the wider the gap. In firms with a strong overtime culture, the leadership gap between full-timers and part-timers is statistically significant for all degrees of part-time work. In firms with a weak overtime culture, the leadership gap is not statistically significant, that is, part-timers do not experience a disadvantage concerning leadership positions compared to full-time employees. Briefly, the leadership gap increases with a stronger overtime culture in a firm, and it decreases with higher numbers of working hours of part-timers. Consequently, the gap for part-timers with low working hours is biggest in firms where all employees work overtime. These results are in line with hypothesis 2.

Hypothesis 3 states that if part-time employees increase their contractual working hours, the leadership gap decreases in restricted work-from-home policies in a firm but not in widespread ones. To test this proposition, we analyze the interaction term between work-from-home policies and contractual working hours. Model (m3) in Table 2 displays a statistically insignificant interaction coefficient. Based on these results, we calculate the leadership gap at different contractual working hours across different levels of work-from-home policies which are displayed in Table 5.[3]

As with the results on overtime culture, the results in the rows of Table 5 show that the leadership gap increases as work-from-home policies become more restrictive. The columns of Table 5 indicate that the leadership gap decreases if part-timers have more contractual working hours. With respect to hypothesis 3, again, the colors of the cells are relevant. The white cells exhibit combinations of contractual working time and work-from-home policies that do not lead to a significant leadership gap between full-time and part-time employees. In firms in which working from home is restricted, the leadership gap is statistically significant for all degrees of part-time work, while in firms in which working from home is widespread, the leadership gap is statistically insignificant for all degrees of part-time work. In firms, in which work-from-home policies are moderately restricted, employees with very low degrees of part-time experience a disadvantage when they desire a leadership position, while employees with moderate and high degrees of part-time do not. Briefly, the leadership gap between female full-time and part-time employees increases when work-from-home policies are more restricted in a firm, and it decreases with higher numbers of working hours of part-timers which supports hypothesis 3. Taken together, the empirical results suggest that overtime culture and work-from-home policies are important for part-timers' chances of obtaining a leadership position with supervisory responsibility.

To investigate the robustness of the empirical results, we conduct several additional analyses. These address the operationalization of working time, time structure, and sampling issues. First, a key assumption of our empirical analysis is the linearity of working time. To allow for alternative functional forms, we offer a categorical operationalization of contractual working time. This approach lies methodologically between a binary distinction between full-time and part-time that is prevalent in the literature and our new approach, which allows contractual working hours to vary continuously. As boundaries for the working time categories, we lean on those proposed by Deschacht (2017), who examines a non-linear relationship between working time and promotion to managerial or authority positions. Using contractual working hours over 35 hours as a reference, contractual working hours under 25 and contractual working hours between 25 and 35 represent different levels of part-time work. Model (r1) in Table 6 shows that female employees working in either of the two part-time categories are less likely to have supervisory responsibility compared to female employees working at least 35 contractual hours. This is consistent with the results in the main model (m1). The coefficient for working up to 25 hours is smaller than the coefficient for working between 25 and 35 hours ($p = 0.029$). This result is consistent with the findings on the average predicted leadership gap presented in Table 3, which indicate that the gap between full-time and part-time employees is more pronounced when individuals work fewer hours. The results of the moderations (models (r2) and (r3)) and the pattern of the leadership gaps of the main analyses remain qualitatively the same except for the interaction between high part-time work and overtime culture in model (r2). This could be due to the small number of observations in this category but does not contradict our conjecture that part-time employees are heterogeneous.

Second, we run a panel probit model to address the time structure. Since our panel with four waves is very short and highly unbalanced, a random-effects model is preferred over a fixed-effects model. Model (r4) in Table 6 confirms the statistically significant relationship between contractual working hours and the probability of holding a leadership position with supervisory responsibility. The results of the moderations (models (r5) and (r6)) and the pattern of the leadership gaps are also in line with those of the pooled probit model.

Third, sample selection can be problematic. On the one hand, some jobs do not allow working from home, resulting in employees always being present on-site. This leads us to restrict the sample to employees for whom it is technically possible to work from home (models (r7)–(r9), Table 7). On the other hand, part-time leadership is only an issue for employees in jobs where a leadership position with supervisory

[3] While we are conscious of the fact that the maximum value of work-from-home policies in our sample is 0.286, we still predict the leadership gap for values of work-from-home policies ranging from 0 to 1.

Table 3
Average Predicted probabilities of holding a leadership position with supervisory responsibility at t for different levels of contractual working hours at t-1.

	… at a contractual working hours$_{t-1}$ of …							
	40 h	35 h	30 h	25 h	20 h	15 h	10 h	5 h
Average predicted probabilities of holding supervisory responsibility in t	0.251*** (0.021)	0.195*** (0.013)	0.147*** (0.013)	0.107*** (0.016)	0.077*** (0.017)	0.053*** (0.017)	0.036** (0.015)	0.024* (0.013)
Average predicted leadership gap	–	0.057***	0.105***	0.144***	0.175***	0.198***	0.215***	0.227***

Notes: The average predicted leadership gap (rounded to three decimal places): difference in the average predicted probabilities of holding supervisory responsibility between full-time employees (assumed to work 40hours per week) and employees working different degrees of part-time [5, 10, 15, 20, 25, 30, 35 hours per week]), standard errors of the predicted probabilities in parentheses, *p < 0.10, **p < 0.05, ***p < 0.01.
Source: Our own calculations based on Model (m1) of Table 2.

Table 4
Leadership gap for different degrees of part-time across different overtime cultures.

		Overtime culture										
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Working hours$_{t-1}$	5	−0.160	−0.059	0.026	0.096	0.151**	0.192***	0.224***	0.249***	0.270***	0.288***	0.305***
	10	−0.134	−0.050	0.023	0.085	0.136**	0.178***	0.212***	0.239***	0.263***	0.283***	0.301***
	15	−0.108	−0.041	0.019	0.073	0.119**	0.159***	0.194***	0.224***	0.250***	0.273***	0.294***
	20	−0.084	−0.033	0.015	0.060	0.100**	0.137***	0.171***	0.201***	0.229***	0.254***	0.278***
	25	−0.061	−0.024	0.012	0.046	0.079*	0.110***	0.140***	0.169***	0.196***	0.222***	0.248***
	30	−0.040	−0.016	0.008	0.031	0.055*	0.079***	0.102***	0.125***	0.149***	0.172***	0.195***
	35	−0.019	−0.008	0.004	0.016	0.029*	0.042***	0.055***	0.069***	0.083***	0.098***	0.113***

Notes: Each cell displays the leadership gap (i.e., the difference in the average predicted probabilities of holding a leadership position with supervisory responsibility between full-time employees [40 hours per week] and employees working different degrees of part-time [5, 10, 15, 20, 25, 30, 35 hours per week]) across different levels of overtime culture (0: weak; 1: strong); *p < 0.10, **p < 0.05, ***p < 0.01 (indicating the leadership gap to be statistically different from 0). The darker the cells, the wider the gap.
Source: Our own calculations based on Model (m2) (Table 2).

Table 5
Leadership gap for different degrees of part-time across different work-from-home policies.

		Work-from-home policies										
		1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0
Working hours$_{t-1}$	5	0.379	0.365	0.351	0.337	0.323	0.310	0.296	0.281*	0.265**	0.245***	0.219***
	10	0.379	0.364	0.351	0.337	0.232	0.308	0.293	0.277	0.258**	0.235***	0.206***
	15	0.379	0.361	0.350	0.335	0.320	0.304	0.287	0.268	0.246**	0.219***	0.188***
	20	0.377	0.348	0.345	0.329	0.312	0.293	0.273	0.250	0.225**	0.197***	0.164***
	25	0.366	0.304	0.329	0.310	0.289	0.027	0.244	0.022	0.193*	0.165***	0.135***
	30	0.324	0.194	0.283	0.261	0.239	0.217	0.194	0.170	0.147*	0.122***	0.097***
	35	0.211	0.379	0.178	0.161	0.145	0.129	0.113	0.098	0.082*	0.067***	0.053***

Notes: Each cell displays the leadership gap (i.e., the difference in the average predicted probabilities of holding a leadership position with supervisory responsibility between full-time employees [40 hours per week] and employees working different degrees of part-time [5, 10, 15, 20, 25, 30, 35 hours per week]) across different levels of work-from-home policies (0: restricted; 1: widespread); *p < 0.10, **p < 0.05, ***p < 0.01 (indicating the leadership gap to be statistically different from 0). The darker the cells, the wider the gap.
Source: Our own calculations based on Model (m3) (Table 2).

responsibility is possible. We therefore exclude unskilled and semi-skilled workers (models (r10)–(r12), Table 7). A third selection issue may be due to the presence of children, as part-time work may be used to combine family responsibilities and work. Women with children may have different career aspirations regarding leadership positions or different time capacities. To address this issue, we exclude women with children under the age of 14 years (models (r13)–(r15), Table 7). The results of the analyses and the patterns of the corresponding leadership gaps of these subsamples are robust.

5. Discussion

This study has provided insights into the negative relationship between different degrees of part-time employment and leadership positions in Germany. We complement two strands of literature on working time and leadership. First, female part-time employees are less likely to hold leadership positions (Fietze et al., 2011; Huffman & Cohen, 2004; Rosenfeld et al., 1998) and second, part-time employees are less likely than their full-time counterparts to be promoted at all (Pfeifer, 2010; Zeytinoglu & Cooke, 2008) and specifically to leadership positions with supervisory responsibility (Deschacht, 2017). We go one step further and unlock the black box of part-time employees by explicitly considering the number of contractual working hours for holding a leadership position and quantifying the leadership gap between full-time and part-time employees.

While it is plausible that working time can signal work engagement and thus positively affect obtaining a leadership position with supervisory responsibility, it is far less obvious that the effectiveness of this signal depends on the work environment and the employer's perception. The empirical results show that the effect of contractual working time is contingent on employers' expectations of employee visibility and availability, which we capture through the overtime culture and the work-from-home policies of a firm. Our findings extend the qualitative literature that emphasizes that workplace presence (Adams, 1995; Bleijenbergh et al., 2016; Lee et al., 2002; Sheridan, 2004) and employee visibility (McDonald et al., 2008) impede the career advancement of part-time employees. Additionally, our results support the theoretical considerations that the signaling environment (i.e., the work

environment) matters for the perception of the contractual working hours signal. Briefly, our analysis quantifies this joint effect of contractual working time and the work environment, overtime culture and work-from-home policies, on part-timers' likelihood of being in a leadership position.

5.1. Practical implications

For part-time employees who aspire to a leadership position with supervisory responsibility, two aspects are relevant. First, it is advantageous to choose a high contractual working time because each additional hour increases the chances of obtaining a leadership position with supervisory responsibility. Second, the effect of contractual working time depends on the work environment. If overtime is common in a firm or if working from home is restricted, it is difficult to obtain a leadership position on a part-time basis. Therefore, applying for or staying in a firm with a liberal work attendance environment seems promising, as employers in such environments – on average – do not interpret reduced working hours as a lack of work engagement. While employees can observe a work environment while working, applicants can try to disclose it during their job interview. This finding helps to improve the fit between an employee and a firm in terms of their requirements related to contractual working hours and obtaining a leadership position with supervisory responsibility. Organizations can actively support the quality of the match by credibly promoting information about their work environment, such as overtime culture and work-from-home policies, to attract part-timers interested in leadership positions.

Employers may find it attractive, especially in times of skills and management shortage, to draw on qualified and skilled part-time employees to fill leadership positions (Baldiga, 2005; Barnett & Hall, 2001). In this vein, creating a liberal attendance environment in the workplace, can encourage part-time leadership and attract candidates. Employers themselves can even engage in signaling positive attitudes toward part-time leadership in the sense of employer signaling (Backes-Gellner & Tuor, 2010) by advertising liberal attendance environments. Employers can reorganize business processes to make overtime less common or help managers evaluate employees on output rather than on hours worked, so that employees do not see overtime as an expectation. A weak overtime culture may then lead to qualified female part-timers self-selecting into leadership positions in these firms. Regarding working from home, the Covid pandemic has shown the feasibility of remote work across various occupations, so that employers are likely to continue to relax working time rules and generously granting work-from-home opportunities and therefore putting more emphasis on output controls than visibility (Groen et al., 2018). Formulating concrete liberal work-from-home policies may reduce the leadership gap between full- and part-timers and thus foster part-time leadership. We predict that these organizational changes will reduce the influence of work environment and work arrangements on the distribution of leadership positions within firms.

Work environments enabling part-time leadership will in turn probably affect work organization. First, distributing leadership positions to part-timers can result in a particular form of shared leadership, which has been shown to be an effective management tool in professional teams (Muethel & Hoegl, 2013). Second, attracting female leaders – the largest group of employees who work part-time – can be beneficial for firms as they are more "other-oriented" than men concerning working time arrangements, which may improve all employees' work-life balance (Devicienti et al., 2019; Pasamar & Alegre, 2015). This, in turn, may foster a more inclusive workplace culture. Having more female leaders has also been found to reduce gender-pay disparities within organizations (Kalogeraki & Georgakakis, 2022). By actively

Table 6
Robustness checks: measurement and time.

	Categorical working hours			Random effects		
	(r1)	(r2)	(r3)	(r4)	(r5)	(r6)
Contractual working hours$_{t-1}$: ≤ 25	−0.831***	1.179**	−0.794***			
	(0.190)	(0.576)	(0.206)			
Contractual working hours$_{t-1}$: 25 < . < 35	−0.360**	−1.118*	−0.286			
	(0.176)	(0.613)	(0.189)			
Contractual working hours$_{t-1}$: ≥ 35	ref.	ref.	ref.			
Contractual working hours$_{t-1}$: ≤ 25 × overtime culture		−3.376***				
		(0.962)				
Contractual working hours$_{t-1}$: 25 < . < 35 × overtime culture		1.127				
		(0.930)				
Contractual working hours$_{t-1}$: ≤ 25 × work-from-home policies			−1.436			
			(2.935)			
Contractual working hours$_{t-1}$: 25 < . < 35 × work-from-home policies			−3.142			
			(2.707)			
Contractual working hours				0.146***	−0.019	0.146***
				(0.042)	(0.068)	(0.041)
Overtime culture	−0.044	0.196	−0.050	0.105	−9.187**	0.107
	(0.347)	(0.399)	(0.347)	(0.865)	(4.143)	(0.859)
Work-from-home policies	−0.356	0.020	0.423	−0.741	−0.803	0.338
	(1.560)	(1.611)	(1.967)	(3.533)	(3.439)	(16.902)
Contractual working hours × overtime culture					0.261**	
					(0.117)	
Contractual working hours × work-from-home policies						−0.031
						(0.492)
Employee level controls	Yes	Yes	Yes	Yes	Yes	Yes
Establishment level controls	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	976	976	976	976	976	976
Number of employees	769	769	769	769	769	769
Number of establishments	343	343	343	343	343	343
Pseudo R-squared (pooled probit)/log pseudo likelihood (random effects)	0.241	0.260	0.242	−324.314	−322.130	−324.354
Correctly predicted (pooled probit only)	0.846	0.840	0.845			

Notes: Dependent variable: leadership with supervisory responsibility$_t$; dummy variables for survey wave, state (16), and industry (11) included; employee and establishment characteristic controls as in model (m1) (Table 2); standard errors clustered at employee level in parentheses, *p < 0.10, **p < 0.05, ***p < 0.01.
Source: Our own calculations based on data from the LPP 2012–2019 and the IAB Establishment Panel 2012–2019.

Table 7
Robustness checks: sample restriction.

	Subsample: working from home possible			Subsample: without unskilled and semi-skilled employees			Subsample: employees without children		
	(r7)	(r8)	(r9)	(r10)	(r11)	(r12)	(r13)	(r14)	(r15)
Contractual working hours $_{t-1}$	0.057***	−0.008	0.048***	0.050***	−0.012	0.046***	0.051***	−0.017	0.046***
	(0.014)	(0.032)	(0.014)	(0.011)	(0.031)	(0.012)	(0.011)	(0.030)	(0.012)
Overtime culture	0.270	−3.419**	0.271	−0.006	−3.447**	−0.005	0.018	−3.984**	0.017
	(0.444)	(1.721)	(0.444)	(0.377)	(1.669)	(0.378)	(0.387)	(1.736)	(0.386)
Work-from-home policies	0.152	0.183	−11.599	0.191	0.231	−3.859	−0.498	−0.394	−5.471
	(2.098)	(2.116)	(7.785)	(1.568)	(1.581)	(5.335)	(1.732)	(1.751)	(7.195)
Contractual working hours $_{t-1}$ × overtime culture		0.104**			0.098**			0.112**	
		(0.049)			(0.047)			(0.048)	
Contractual working hours $_{t-1}$ × work-from-home policies			0.334			0.121			0.148
			(0.238)			(0.168)			(0.211)
Employee level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Establishment level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	622	622	622	870	870	870	791	791	791
Number of individuals	575	575	575	689	689	689	633	633	633
Number of establishments	276	276	276	321	321	321	306	306	306
Pseudo R-squared	0.318	0.322	0.321	0.269	0.274	0.270	0.248	0.254	0.249
Correctly predicted	0.849	0.847	0.844	0.849	0.845	0.849	0.833	0.834	0.833

Notes: dependent variable: leadership with supervisory responsibility$_t$; dummy variables for survey wave, state (16), and industry (11) included; employee and establishment characteristic controls as in model (m1) (Table 2); standard errors clustered at the employee level in parentheses, *p < 0.10, **p < 0.05, ***p < 0.01.
Source: Our own calculations based on data from the LPP 2012–2019 and the IAB Establishment Panel 2012–2019.

promoting part-time leadership opportunities and creating supportive work environments for this, organizations can not only address gender inequities but also build more sustainable and equitable workplaces, which is particularly beneficial in times of skill shortages.

5.2. Limitations and further research

Although the theoretical argument is concisely developed and the empirical results are discussed in the light of several robustness checks, this study has limitations and offers room for further research. First, our theoretical argument relies on the assumption that employees can choose their contractual working time. In reality, this is an oversimplification and may not be true. Similarly, we cannot distinguish between voluntary and involuntary part-time employment in our data. Since involuntary part-time employment is not pronounced in Germany (Eurostat, 2023b), we do not consider it an issue in our analyses. Nevertheless, future research could emphasize voluntary and involuntary reductions in working time when investigating part-time leadership.

Second, our empirical analysis is based on female employees only. This is motivated by the fact that the majority of part-timers in Germany are female. Although this is an interesting phenomenon in itself, it would be worthwhile to examine the leadership gap between men and women, especially because women are underrepresented in leadership positions. In this sense, also quantifying and comparing the leadership gap between full-timers and part-timers for men and women would explicitly contribute to understanding the gender gap in leadership. In this vein, conducting a more detailed examination of the prevalence of children and their influence on part-time leadership could also prove to be promising for further research, as children not only influence the decisions about contractual working hours, but also may shape the career aspirations of their parents. With the changing working time preferences of Generation X, part-time work, and therefore leadership in part-time work, may also become relevant for men in the coming years. Further research is needed to explore part-time work and leadership positions with supervisory responsibility for men.

Third, the restriction of the sample to Germany is a valid starting point for drawing a picture of West European countries. Future empirical studies could, however, extend the understanding in different institutional settings (e.g., such as working time regulations or childcare facilities other than in Germany). Additionally, analyses of data from Eastern European countries where part-time work is not a female phenomenon (e.g., in Romania [or Bulgaria] about 62 [54] percent of all part-timers are male) (Eurostat, 2023a) – could provide a more complete picture of part-time leadership. It would also be interesting to analyze the role of institutional arrangements in a comparative setting.

Fourth, while we find that a firm's overtime culture and work-from-home policies moderate the leadership gap between full-time and part-time female employees, future research could investigate whether these work environments also moderate other gaps, such as the gender pay gap. This would contribute to another strand of research that highlights long working hours and inflexible working conditions as important drivers of the persistent gender pay gap (Cortés & Pan, 2019; Goldin, 2014). Conversely, it would be valuable to examine how other work environments, such as flexible working arrangements, affect the leadership gap between full-time and part-time employees as well as the gender pay gap.

Fifth, employers and employees have gained considerable experience of working from home during the pandemic. In the coming years, it would be valuable to examine the relationship between working from home and the career prospects of part-time workers, before and after the pandemic. This would reveal whether the importance of visibility in the workplace has diminished following a radical change in the work environment.

Finally, to address the empirical issue of potential endogeneity, further research should use longer panels to observe within-person variation into and out of leadership positions.

6. Conclusion

Part-time workers are less available and less visible – and that matters. This study has described one of the consequences of working part-time as the leadership gap – that full-timers tend to hold leadership positions more often than part-timers. This leadership gap has many causes, including that part-time workers are different and that managers attribute different characteristics to part-timers compared to full-timers.

To disentangle these facets, we focus on the difference between full-time and contractual working hours for each employee in our sample, allowing for different degrees of part-time work, rather than simply dichotomizing employees as part-time and full-time. While this strategy reduces the bias arising from the different characteristics of part-time and full-time employees, it does not eliminate the possibility that part-

timers may simply be different from full-timers. More importantly, this study has also shed some light on the role of the work environment serving as a strong conditioning factor for the size of the leadership gap. Our empirical results show that the leadership gap varies across firms with different overtime cultures and work-from-home policies. In a world where only individual characteristics influence the leadership gap, the work environment's impact on the leadership gap would be minimal. However, this study highlights that managers do consider part-time employment as an adverse signal for leadership positions.

Our findings paint a more nuanced picture of the relationship between part-time work and leadership than previous studies have suggested. Part-time work is certainly not incompatible with leadership positions, but rather reduces the likelihood of holding a leadership position. This negative effect seems to be present across companies and increases as the number of contractual working hours declines relative to full-time employment. Companies with strict attendance regimes also tend to have wider leadership gaps. Ultimately, this research suggests that part-time work and leadership is compatible – if the reduction in hours is not too large and if part-time workers aspiring to leadership positions consider the work environment of prospective companies or actively try to craft their current company's work environment to improve their chances of advancement.

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Data availability statement

Data are provided via on-site use at the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) in Nuremberg/Germany.

CRediT authorship contribution statement

Stephanie Funk: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Susanne Warning:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization.

Declarations of competing interest

none.

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