

# Home-Based Telework and Presenteeism Across Europe

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**Objective:** Flexible work arrangements such as telework are gaining importance. Although telework is accompanied by advantages for employees such as increased flexibility, current research reveals associations between home-based telework and self-endangering behavior such as sickness presenteeism. As empirical evidence is still scarce, we explore the relationship between home-based telework and sickness presenteeism across Europe. **Methods:** We perform multilevel analyses including 25,465 individuals who responded to the 6th wave of the European Working Conditions Survey 2015. **Results:** Home-based telework is positively related to sickness presenteeism. The results are quite robust across different measures of sickness presenteeism and to several sensitivity analyses. **Conclusion:** Although sickness presenteeism can be functional for specific illnesses, organizations should be aware of possible risks related to home-based telework. They should design telework in a way that it reduces triggers for self-endangering behavior.

**Keywords:** employee health, European Working Conditions Survey, multilevel analyses, presenteeism, telework

Due to increased flexibility requirements for organizations—triggered by globalization and related competitive pressure in combination with technical improvements in information and communication technology (ICT)—flexible work designs such as telework are currently gaining importance.<sup>1,2</sup> Telework (also referred to as telecommuting) is defined as working outside the employer's premises making use of modern ICT.<sup>3</sup> The locations outside the employer's premises can be various (eg, home or telework centers, remote or customers' offices). In the present study, we focus on working from home, referred to as (home-based) telework.

Since the beginning of the 21st century the share of employees using telework in the United States as well as in parts of Europe has increased.<sup>3</sup> Moreover, telework has become an extremely important instrument in the protection against and the containment of the covid-19 pandemic.<sup>4</sup> In Germany, based on a representative panel survey, only 12% of employees report that they have a

teleworking agreement with their employer in 2017 (in comparison: 9% in 2015), which is well below the EU average. However, around 31% of employees state that they have worked from home, even without an agreement, at least occasionally.<sup>5</sup> As there is the potential to substantially increase the share of teleworkers there is currently a public and political debate on home-based telework in Germany<sup>6</sup> pushed by the developments in the course of the covid-19 pandemic.

While proponents mainly emphasize the advantages of telework such as reduced commuting time, increased autonomy and flexibility, higher productivity as well as a better work-life-balance, telework is also associated with adverse conditions for employees. For instance, it has been found that telework is often accompanied by greater responsibilities and higher demands on self-management, raising the risk for self-endangering work behaviour, that is, an employee's work behaviour to manage adverse job demands that increases health risks and prevents recovery from work at the same time.<sup>7</sup> Research indicates that teleworkers tend to work longer (also in leisure time) and more intensively than employees at the employer's premises.<sup>2,3,8</sup> This is in line with the phenomenon of "the autonomy paradox."<sup>9</sup> It describes that a high degree of job autonomy and flexibility is often accompanied with an intensification of work and longer working hours which in turn leads to more organizational control in employees' lives. This phenomenon is especially pronounced among teleworkers as they try, for instance, to compensate for potential colleagues' extra work due to their absence or to keep pace with office routines.<sup>9</sup>

Besides work intensification, telework may also increase the risk of working despite illness, referred to as (sickness) presenteeism.<sup>10</sup> Different reasons may explain why the risk for presenteeism is higher among employees working from home. First, employees working from home do not have to travel to work and are in a convenient surrounding. Thus, possible barriers to work despite illness are reduced and these lower barriers may make it even harder to justify their absence from work due to sickness towards their supervisors and colleagues. Second, teleworkers do not risk to infect their colleagues in case of a contagious illness.<sup>11</sup> Third, they are not under surveillance by their supervisor or team colleagues and thus do not need to justify why they work despite illness. Taken as a whole, telework may facilitate engaging in presenteeism.

Research focusing on the association between telework and presenteeism is still scarce. However, exploring this relationship is highly relevant. Research on presenteeism highlights its far-reaching consequences for individuals and organizations. On the one hand, presenteeism can be functional under certain circumstances (eg, it might be therapeutic for specific illnesses).<sup>12</sup> On the other hand, research findings indicate that working despite illness may also result in adverse health conditions and subsequent sickness absence in the long run.<sup>13–15</sup> Furthermore, presenteeism is associated with reduced work productivity<sup>16</sup> and a higher risk of making errors.<sup>17</sup>

In this paper, we address this research gap by investigating the relationship between home-based telework and presenteeism. We base our analyses on the European Working Conditions Survey (EWCS) 2015, containing data on employees in 35 European countries. Based on the previous literature summarized above, we expect a positive association between presenteeism and home-based telework, as working from home facilitates engaging in presenteeism. To ensure and check the robustness of our findings,

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Clinical Significance: Involving less barriers to work despite illness, employees working from home are at higher risk to engage in presenteeism. Empirical results based on the EWCS 2015 support this assumption, indicating a robust positive correlation between home-based telework and presenteeism increasing with the intensity of doing telework.

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we do the following: first, as already mentioned in the introduction, countries differ with respect to their prevalence of home-based telework.<sup>3</sup> By using the EWCS data, we are able to control for country-specific differences. This enables us to investigate whether the relationship is robust and similar across countries. Second, except for controlling for different sets of covariates (individual characteristics, health status, job-related characteristics), we also perform various sensitivity analyses by excluding certain subgroups (eg, employees with chronic diseases). Furthermore, we include additional variables which may account for (some part of) or shape the relationship between home-based telework and presenteeism (eg, work engagement or workload), thus making a first step in investigating whether third variables affect or might even be responsible for the estimated relationship. Third, as presenteeism research is still a quite young field, measurement is not yet standardized. As a consequence, mainly non-validated single-items are used<sup>18,19</sup> differing with respect to their wording, their response scale, and their recall period.<sup>15</sup> Comparing three different measures enables us to both, check the robustness of our results and contribute to the sickness presenteeism research.<sup>12</sup>

**METHODS**

**Data: European Working Conditions Survey 2015**

We base our analyses on the 6th wave of the European Working Conditions Survey (EWCS) 2015.<sup>20</sup> We restrict the sample to employees aged 15 to 65 years, living in an EU-28 country. We exclude self-employed individuals and individuals who are currently in apprenticeship or training. Focusing on respondents with valid data on the variables included in the main analyses, the analysis sample amounts to 25,465 individuals.

**Variables**

As outcome, we apply three different approaches to measure sickness presenteeism. Based on the question “Over the past 12 months did you work when you were sick?” we generate an indicator variable that equals 1 if the respondent answered yes and 0 if the respondent answered no or has not been sick over the past 12 months (sickness presenteeism prevalence). The second measure focuses on the number of working days showing presenteeism, while those reported to have not worked when sick were coded with a zero while individuals reporting not having been sick were excluded (sickness presenteeism days). The third indicator also considers the days of sickness absence from work: the sickness presenteeism propensity is calculated as the ratio of days showing presenteeism and the sum of days in presenteeism and sickness absence ranging between 0 (all days of sickness were spent in sickness absence) and 1 (all days of sickness were days showing presenteeism). This propensity measure represents the individual probability to opt for presenteeism in times of sickness. As a result, it is more appropriate to reveal factors influencing the individual decision process between sickness absence and presenteeism in case of an illness.<sup>21</sup>

As main predictor we focus on telework captured by the question “How often have you worked in each location during the last 12 months - Your own home?” with a response scale taking the frequency into account: daily, several times a week, several times a month, less often, and never. In the main analyses, we include telework by dummy variables for each of the different categories, taking “never” as reference category. Unfortunately, the data at hand do not include a variable that allows to examine the “voluntariness” of working from home. However, studies indicate that working from home involuntarily concerns only very few employees.<sup>22</sup>

We include different sets of covariates that are likely related to both, the probability to work from home as well as to show presenteeism behavior and might thus bias the estimated

relationship. As individual characteristics we consider: sex, four age-group dummies (15 to 30, 30 to 40, 40 to 50, 50 to 65), four dummies for the educational level according to ISCED-97 (no/primary, secondary, post-secondary, tertiary education), a dummy whether or not the respondent cares for children, grandchildren, elderly or disabled relatives at least several times a week, dummies for the occupational group according to ISCO 2008 (2-digit) as well as 10 dummies for the industry sector (NACE Rev. 2). In a second step, we include dummies for the respondent’s self-rated health

**TABLE 1. Sample Description of Relevant Variables**

	%
<b>Outcomes: sickness presenteeism (SP)</b>	
SP prevalence	38.2
SP days* (mean)	3.69 (SD: 11.94)
SP propensity† (mean)	0.43 (SD: 0.41)
<b>Main predictor: telework</b>	
Telework: never	79.0
Telework: less often	8.2
Telework: several times a month	4.7
Telework: several times a week	4.1
Telework: daily	4.0
<b>(1) Individual characteristics</b>	
Male	50.7
Female	49.3
Age: 15–29	17.5
Age: 30–39	25.0
Age: 40–49	27.9
Age: 50–65	29.7
ISCED: no/primary	2.1
ISCED: secondary	57.7
ISCED: post-secondary	15.3
ISCED: Tertiary	24.9
Caring for children, relatives, etc	46.2
NACE: Agriculture	1.5
NACE: Industry	18.9
NACE: Construction	6.0
NACE: Commerce and hospitality	18.5
NACE: Transport	6.2
NACE: Financial services	3.8
NACE: Public administration and defence	6.8
NACE: Education	9.6
NACE: Health	12.6
NACE: Other services	16.1
<b>(2) Self-rated health status</b>	
Very good	26.5
Good	53.6
Fair	17.8
Bad	1.9
Very bad	0.2
<b>(3) Job-related characteristics</b>	
Working hours: part-time	21.6
Working hours: full-time	78.4
Contract: permanent	84.2
Contract: temporary	15.8
Tenure: ≥ 1 year	17.0
Tenure: 2–5 years	26.9
Tenure: > 5 years	56.2
Ownership: Private	68.4
Ownership: Public	24.9
Ownership: other	6.7
Size: 1–9 persons	20.6
Size: 10–249 persons	41.1
Size: 250+	38.4
N	25,465

\*N = 22,252.

†Cf. Gerich<sup>18</sup>:  $SP\_days / (SP\_days + absent\_days)$ ,  $N = 14,286$ ; Source: EWCS 2015, weighted results.

status (very good, good, fair, bad, very bad) in order to account for the fact that individuals with adverse health conditions might potentially be more likely to work from home as well as to show presenteeism. A third set of covariates includes (further) job-related characteristics, namely whether or not the respondent works full-time or part-time, has a temporary or permanent contract, the number of years the respondent has been working in the current job (1 year or less, 2 to 5 years, more than 5 years) as well as the company size (1 to 9, 10 to 249, 250 and more). The results are very similar when we additionally control for leadership, ie, whether or not the employee has a leading function. Table 1 summarizes the sample means of the included variables.

### Additional Control Variables

In order to check the robustness of our results and to explore whether the relationship might be biased by third variables, we include several additional variables. First, we consider work engagement as it is associated with telework as well as presenteeism. On the one hand, meta-analytical results suggest a positive relationship between presenteeism and work engagement.<sup>18</sup> On the other hand, a recent study focusing on increased telework due to the recent covid-19 pandemic indicates that working from home increases work engagement.<sup>23</sup> Thus, work engagement might explain the relationship between telework and presenteeism to some extent. To control for work engagement, we include variables on the following three statements (Q90a-c): “At my work I feel full of energy,” “I am enthusiastic about my work” and “Time flies when I am working.” Second, it might be the case that the association between telework and presenteeism is driven by a specific group who reacts to flexibility requirements such as telework with self-endangering work behavior as a kind of maladaptive coping behavior. To measure the employees predisposition to self-endangering work behavior, we adjust our analyses by a variable on extending working time (“working in free time to meet work demands,” Q46), which is also identified as one type of self-endangering work behavior by Krause et al<sup>24</sup> besides presenteeism. Third, as already stated in the introduction and in line with the “the autonomy paradox” a high degree of work autonomy and flexibility is often accompanied with an intensification of work and longer working hours.<sup>9</sup> A high work intensity may in turn be related to sickness presenteeism.<sup>18</sup> Thus, we adjust for work intensity as possible third variable measured by two indicators (“working at a very high speed” and “working to tight deadlines,” Q49a-b). The results are also similar when the number of working hours are included in order to control for the individual workload (results not shown).

Fourth, as organizations differ in their regulations concerning telework, in their structure as well as in their climate, we included variables approximating the organizational context (Q71a-c). Specifically, we assume that organizations with work councils and/or health and safety delegates likely pay more attention to possible health risks stemming from telework. Thus, it might be that the organizational context mitigates the association between telework and presenteeism.

Fifth, we adjust for work-family conflict as a possible confounder. Research indicates that both, presenteeism and telework are significantly associated with work-to-family and family-to-work conflicts.<sup>8,18</sup> For that reason we include five items proxying work-to-family and family-to-work conflicts (Q45a-e).

Finally, in order to rule out that the relationship between telework and presenteeism is driven by a higher level of autonomy in general (eg, the ability to choose the order of tasks and methods of work), we also estimate a model controlling for job autonomy at work (Q54a-b).

### Empirical Approach

In a first step, we explore the relationship between home-based telework and presenteeism by taking the pooled sample

containing the EU-28 countries and perform multilevel regressions with random intercepts. Applying multilevel regressions allows us to take the nested structure of the data into account by adjusting for country as the second level. We perform linear multilevel regressions for all outcome variables, thus we perform a linear probability model when considering the dichotomous measure of sickness presenteeism prevalence. The different sets of control variables are included simultaneously. Table A1 in the Appendix, (<http://links.lww.com/JOM/A798>) summarizes the results when the different sets of covariates are included successively also showing the raw correlation without adjusting for covariates. Moreover, Figure A1 in the Appendix (<http://links.lww.com/JOM/A798>) presents the aggregate relationship between the share of teleworkers and the share of employees showing presenteeism as well as the average number of presenteeism days by country indicating a positive relationship. In a second step, we check the sensitivity of the estimated relationship by performing several subgroup analyses and exclude certain individuals from the analyses (eg, chronically ill respondents). In addition, we include further individual characteristics (eg, work engagement) to explore whether the estimated relationship is driven by third variables. We report intra-class correlations for the different multilevel regressions. The intra-class correlation represents the within cluster correlation by the share of variance that is attributable to the country level. Intra-class correlations range from 0 if the grouping [ie, the country level] conveys no information to 1 if all members of a group (ie, the country level) are identical.

One might concern that applying linear models to binary outcomes (sickness presenteeism prevalence) or count data (sickness presenteeism days) may lead to biased estimates. For that reason, we additionally performed a probit model with respect to the binary outcome as well as a poisson and a negative binomial model for the count data variable. Overall, the results are very similar (results available upon request). We conclude that the results are not sensitive to the model specification and prefer presenting the results of the linear models for the ease of interpretation and consistency.

Given the cross-sectional nature of the data and the empirical approach chosen, it has to be considered that the results are purely descriptive and we do not claim any causal interpretation of our results.

## RESULTS

### Sample Description

Table 1 reports the summary statistics for the analysis sample. With respect to sickness presenteeism around 38% of the sample reported to have worked at least once while sick during the last 12 months (sickness presenteeism prevalence). On average, employees showed 3.69 days presenteeism (sickness presenteeism days). On 43% of all sickness days, employees were working while sick (sickness presenteeism propensity). Regarding home-based telework, the majority of employees in the EU-28 reports to never work from home (79%). About 13% work at least several times a month from home, while only 4% work solely from home. The sample is almost balanced in terms of the ratio of men to women. The majority of employees works full-time (78%) and has permanent job contracts (84%). About 56% of the employees work for more than 5 years for their current employer and the majority of our sample reports to have a good or very good health status (about 80%).

### Multilevel Results

In a next step, we explore the relationship between home-based telework and presenteeism. By estimating linear multilevel regressions, we take the hierarchical structure of the data, that is, individuals nested in countries, into account and control for the different sets of covariates discussed in section “Variables”. Table 2 reports the results for the three different outcome variables for

**TABLE 2.** Telework and Sickness Presenteeism (Multilevel Model)<sup>a</sup>

Dependent: Sickness Presenteeism (SP)	All			Female			Male		
	SP Prevalence	SP Days	SP Propensity	SP Prevalence	SP Days	SP Propensity	SP Prevalence	SP Days	SP Propensity
Telework: never	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Telework: less often	0.0612*** (0.0110)	0.5302 (0.2964)	0.0322** (0.0123)	0.0614*** (0.0157)	0.9403* (0.4319)	0.0031 (0.0165)	0.0670*** (0.0156)	0.1832 (0.4039)	0.0689*** (0.0183)
Telework: several times a month	0.1051*** (0.0143)	-0.0051 (0.3833)	0.0775*** (0.0154)	0.0905*** (0.0200)	0.3124 (0.5500)	0.0652** (0.0208)	0.1210*** (0.0206)	-0.388 (0.5296)	0.0918*** (0.0231)
Telework: several times a week	0.1109*** (0.0150)	0.8213* (0.4006)	0.1016*** (0.0164)	0.0924*** (0.0206)	1.4799** (0.5662)	0.0814*** (0.0217)	0.1322*** (0.0218)	0.0949 (0.5650)	0.1286*** (0.0251)
Telework: daily	0.1069*** (0.0159)	1.3781** (0.4274)	0.1472*** (0.0176)	0.0976*** (0.0212)	1.5726** (0.5874)	0.1472*** (0.0231)	0.1193*** (0.0242)	1.1104 (0.6238)	0.1453*** (0.0270)
(1) Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(2) Self-rated health status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(3) Job-related characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ICC	0.0862	0.0187	0.0612	0.0884	0.0223	0.0564	0.0841	0.0147	0.0706
LL	-16059	-85786	-6881	-8564	-45676	-3733	-7487	-40044	-3137
Chi <sup>2</sup>	1719.6	1651.1	403.1	933.7	980.0	251.7	716.0	708.3	219.1
N	25,465	22,252	14,286	13,379	11,731	7,814	12,086	10,521	6,472

Standard errors in parentheses. For the included sets of covariates (1), (2), and (3), see Table 1. Chi<sup>2</sup>, testing the model with versus model without random intercepts; ICC, intraclass-correlations for the country-level; LL, log-likelihood; EWCS 2015, unweighted results.

<sup>a</sup>See Table A1 in the Appendix, <http://links.lww.com/JOM/A798> for a stepwise inclusion of the covariates.

\**P* < 0.05.

\*\**P* < 0.01.

\*\*\**P* < 0.001.

presenteeism: the prevalence of sickness presenteeism, the number of sickness presenteeism days, as well as the propensity of sickness presenteeism. Due to the different measures of presenteeism, the number of observations varies between 14,286 and 25,465, which should be considered in the interpretation of the results. Overall, the results indicate that home-based telework is strongly and significantly associated with presenteeism, even when the full set of individual and job-related covariates are taken into account. For instance, working from home several times a week or daily is related to an 11 percentage point higher probability to show presenteeism at least once over the last 12 months as compared with those never working from home. The relationship tends to increase with the extent of doing home-based telework. Intraclass-correlations suggest that about 8% of the variation in presenteeism can be attributed to differences between countries. This comparatively small proportion suggests that the relationship between home-based telework and presenteeism might rather be attributable to individual characteristics and differences in the populations across countries, for example, with respect to differences in occupations. Taking the number of sickness presenteeism days over the last 12 months as dependent variable (and thus, excluding those not having been sick), it turns out that those working daily from home work on average 1.4 more days when sick (respectively 0.8 more days when working several times a week from home) as compared with those never working from home. Doing home-based telework less often turns out not to differ significantly from zero. The proportion of days showing presenteeism increases with the frequency of working from home. While employees working less often in telework showed presenteeism on 3% of their sickness days, employees working daily from home report to spent nearly 15% of their sickness days with presenteeism.

In a next step, we perform sex-specific analyses, as there are likely systematic differences across sex in both, sickness presenteeism<sup>18,25</sup> and working from home.<sup>26</sup> The estimates for the sickness presenteeism prevalence are slightly higher for men (Table 2, Column 7) than for women (Table 2, Column 4), independent from

the intensity of doing telework. Interestingly, the estimates are higher for women when we focus on sickness presenteeism days as dependent variable. None of the estimates for men differs significantly from zero. Regarding the sickness presenteeism propensity, men again show large estimates except for employees working daily from home where men and women score with nearly 15% almost equally. In interaction models the differences between men and women are quantitatively similar in comparison to the sex-specific analyses. However, the interaction effects mainly turned out to be not statistically significant (results available on request).

### Robustness Analyses

While the results indicate a strong relationship between telework and sickness presenteeism, we aim to check the sensitivity of the results by excluding certain subgroups from the analyses and include additional control variables. Although the results of section “Multilevel results” indicate that there are slight differences in the strength of the relationship across sex, the coefficients point to the same direction and are still of comparable size. In order to reduce complexity, further robustness analyses are thus performed for the pooled sample of men and women.

Table 3 summarizes the first part of the robustness analyses, while Column A again presents the main results (cf. Table 2, Column 1) for comparison. Most obviously, one might concern that working from home is not equally possible for all occupations. The analyses of the main specification control for more than 40 different occupations. However, the results might yet be refined to a specific group of employees, for example, working in knowledge-intensive professions, whose job allows working from home. For that reason we focus on individuals responding to work (almost) all of the time with a computer, laptop, or smartphone (about 65% in the EU-28), assuming that these individuals are in principle able to work from home. The results (Column B) are very similar and the estimates tend to be even larger as compared with the main specification. This might be attributable to the more homogenous group we are now focusing on.

**TABLE 3. Robustness Analyses I: Excluding Subgroups<sup>a</sup>**

Dependent: SP Prevalence	A) Main Specification	B) Computer Users Only	C) Without the Chronically Ill	D) Without Part-Time Employed
Telework: never	Reference	Reference	Reference	Reference
Telework: less often	0.0612*** (0.0110)	0.0904*** (0.0156)	0.0656*** (0.0122)	0.0676*** (0.0120)
Telework: several times a month	0.1051*** (0.0143)	0.1431*** (0.0193)	0.1057*** (0.0157)	0.1064*** (0.0154)
Telework: several times a week	0.1109*** (0.0150)	0.1313*** (0.0214)	0.1084*** (0.0169)	0.1075*** (0.0164)
Telework: daily	0.1069*** (0.0159)	0.1258*** (0.0250)	0.1228*** (0.0180)	0.1184*** (0.0173)
ICC	0.0862	0.0789	0.0867	0.0911
LL	-16059	-5877	-12826	-13015
Chi <sup>2</sup>	1719.6	714.2	994.0	1389.3
N	25,465	8,933	20,771	20,757

Standard errors in parentheses; all models include the full set of covariates cf. Table 1; Chi<sup>2</sup>, testing the model with versus model without random intercepts; ICC, intraclass-correlations for the country-level; LL, log-likelihood; SP, sickness presenteeism; EWCS 2015, unweighted results.

<sup>a</sup>For the results for the other definitions of sickness presenteeism see Table A2 and Table A3 in the Appendix, <http://links.lww.com/JOM/A798>.

\*\*\*P < 0.001.

In a next step, we explore whether the results are driven by chronically ill individuals as they might be both, more likely to work from home as well as showing sickness presenteeism (Table 4). In Column C, we therefore exclude those individuals reporting to suffer from any illness or health condition which has lasted, or is expected to last, for more than 6 months (about 18% in the EU-28). Again, the results are quantitatively and qualitatively comparable to the main specification (Column A). For similar reasons, we focus on full-time employed individuals and thus exclude part-time employees from the analyses (Column D). That is, because the group of part-time employees might also include those who have reduced their working time due to health reasons. The analyses again lead to similar results. The robustness analyses have been carried out for the two other measures of presenteeism, also leading to similar results as compared with the main analyses (see Table A2 and A3 in the Appendix, (<http://links.lww.com/JOM/A798>)).

As already mentioned, it has to be considered that the analyses are based on cross-sectional data and the empirical approach chosen does not allow controlling for self-selection or unobserved heterogeneity. Thus, third variables correlated with presenteeism as well as working in jobs where telework is more common, might be responsible for the observed relationship (eg, work engagement or the workload).

Overall, the results are again very similar to the main specification suggesting that the results are unlikely driven by the explored alternative pathways. However, the analyses that try to account for self-endangering work behavior (Column F) are an exception: the estimates almost halve when we include dummies for the extent to which individuals have worked in their free time within the last 12 months. Although we are not able to adequately account for personality traits, this finding suggests that the relationship between telework and presenteeism might predominantly hold

**TABLE 4. Robustness Analyses II: Controlling for Additional Variables<sup>a</sup>**

Dependent: SP Prevalence	A) Main Specification	E) Work Engagement	F) Work in Free Time	G) Work Intensity	H) Organiz. Factors	I) Work-Family Conflict	J) Autonomy
Telework: never	Reference	Reference	Reference	Reference	Reference	Reference	Reference
Telework: less often	0.0612*** (0.0110)	0.0610*** (0.0110)	0.0189 (0.0112)	0.0562*** (0.0110)	0.0572*** (0.0117)	0.0561*** (0.0110)	0.0588*** (0.0111)
Telework: several times a month	0.1051*** (0.0143)	0.1032*** (0.0143)	0.0433** (0.0146)	0.0934*** (0.0143)	0.1113*** (0.0151)	0.0855*** (0.0143)	0.1039*** (0.0144)
Telework: several times a week	0.1109*** (0.0150)	0.1083*** (0.0149)	0.0447** (0.0153)	0.1024*** (0.0150)	0.1127*** (0.0159)	0.0858*** (0.0150)	0.1088*** (0.0150)
Telework: daily	0.1069*** (0.0159)	0.1049*** (0.0159)	0.0439** (0.0165)	0.1013*** (0.0159)	0.1072*** (0.0178)	0.0738*** (0.0160)	0.1037*** (0.0160)
ICC	0.0862	0.0875	0.0844	0.0809	0.0866	0.0784	0.0852
LL	-16059	-15847	-15698	-15810	-13504	-15254	-15929
Chi <sup>2</sup>	1719.6	2075.7	2210.8	2055.1	1888.1	2492.6	1721.5
N	25,465	25,386	25,257	25,313	21,675	24,787	25,278

Standard errors in parentheses; all models include the full set of covariates cf. Table 1; Chi<sup>2</sup>, testing the model with versus model without random intercepts; ICC, intraclass-correlations for the country-level; LL, log-likelihood; SP, sickness presenteeism; EWCS 2015, unweighted results.

<sup>a</sup>For the results for the other definitions of sickness presenteeism see Table A2 and Table A3 in the Appendix, <http://links.lww.com/JOM/A798>.

\*\*P < 0.01.

\*\*\*P < 0.001.

for individuals tending to behave in a self-endangering way of working. Again, Table A2 and Table A3 in the Appendix (<http://links.lww.com/JOM/A798>) report the robustness analyses for the other two measures of presenteeism, which are line with the results presented for the sickness presenteeism prevalence. Taken as a whole, the additional analyses suggest a robust relationship between telework and presenteeism, solely the adjustment for extending working time tends to reduce the association.

## DISCUSSION

The aim of the present study was to explore the relationship between telework and sickness presenteeism across European countries performing multilevel analyses based on the EWCS 2015. In order to check the robustness of the association, we controlled for a wide range of confounding variables, performed various sensitivity analyses and compared three different presenteeism measures. Overall, the results indicate a robust positive correlation between home-based telework and presenteeism while the likelihood for showing presenteeism increases with the intensity of doing telework. This supports our assumption based on previous research that employees working from home are more likely to engage in presenteeism as compared with employees working at the employer's premises.<sup>27</sup> Home-based telework involves less barriers to work despite illness. Employees working at home do not have to commute to the employers' premises, they do not have to worry about infecting others and they can start working next to their breakfast table or their bed.<sup>2</sup> Although we are not able to account for personality traits adequately, first analyses indicate that the relationship might partly be driven by a tendency for self-endangering work behavior (eg, working in the leisure time).

Taken together our results are in line with the growing research strand pointing to the potential harm of flexible work by increasing self-endangering behavior, referring to sociological concepts such as boundarylessness and subjectivization. According to this stream of research, it is argued, that flexible work arrangements usually require or are accompanied with new managerial practices (eg, employees in telework are not under direct observation by their supervisor), which shift control and responsibility from the supervisor to the employee. Employees are no longer guided by supervisors' directives, but decide for themselves how to achieve their work goals. They thereby highly internalize their work goals and interpret missing these goals as a personal failure. As a result, employees are willing to work beyond their personal limits.<sup>7</sup> Thus, this managerial approach, referred to as indirect control,<sup>28</sup> increases the risk of self-exploitative behavior such as sickness presenteeism. Empirical findings support this assumption. The percentage of employees with trust-based working time reporting presenteeism was higher as compared with those with a fixed time schedule.<sup>29</sup> Moreover, a study by Gerich<sup>30</sup> has found a u-shaped curvilinear association between job autonomy or control and presenteeism days. Thus, individuals with very high levels of job control (regarding timing, location, or method) report more presenteeism days than those with medium job control. This curvilinear association is stronger for those with a high vulnerability in terms of health conditions. A recent study by Eurofound<sup>27</sup> further supports our findings. However, the case studies within this study indicate that some employees appreciate the possibility to work from home when feeling unwell. It enables them to work from home adapted to their state of illness and they prefer working from home over taking sick leave. The case studies illustrate that presenteeism is not always harmful, but can also be functional depending on the individual's illness and specific situation. For example, it may have a therapeutic effect by giving structure and distracting individuals from their illness. Furthermore, individuals may receive recognition through their work and support by their colleagues and supervisors.<sup>31,32</sup>

We can conclude that the motives and mechanisms that explain why teleworking is associated with presenteeism can vary according to specific illnesses and situations. These different motives and mechanisms may further explain when presenteeism is detrimental to individual health and when it is not or rather beneficial (eg, in case of chronically sick individuals). Further research revealing these mechanisms is still necessary and might help practitioners to design telework in a way that it does not encourage self-exploitation. Organizations and leaders, however, should be aware that working from home despite illness could be a possible and health-promoting alternative to taking sick leave. In this case, management and supervisor should support their employees and let them adapt their work according to their current state of health.<sup>12</sup>

Although our results are quite robust across different countries (only 8% of the variance is explained by differences on the country level) and despite including a large set of confounding variables, the sex-specific analyses indicate differences in the strength of the association between telework and presenteeism. For example, with respect to the sickness presenteeism propensity, the association between presenteeism and telework seems to be stronger for men than for women. This indicates that men, working at home, are more likely to choose presenteeism instead of absenteeism in case of an illness. Earlier research has also found sex differences in showing presenteeism as well as in using flexible work arrangements. Women work more frequently despite illness and report different motives for presenteeism than men.<sup>18,25</sup> Furthermore, men use home-based telework to work more hours, while women invest their time gained (eg, due to missing commuting time) in childcare as well as work and fulfill their domestic role.<sup>33</sup> However, we have to be careful in interpreting our results with respect to sex differences as the tested interaction effects mainly turned out to be not statistically significant. Thus, further research examining sex differences (eg, with respect to different underlying motives triggered by traditional sex images and unequal distribution of care work) in the relationship between telework and presenteeism is necessary and may help to design telework and the surrounded work context according to sex-specific needs.

Despite our robust findings, our study has several limitations that are worth mentioning and should be considered when interpreting our results. It might be that telework is used by employees with specific diseases helping them to adapt their work demands to their health needs (eg, 11, 34). Thus, it might be that telework is related to increased presenteeism only for a certain group of employees, helping them to deal with their illness. For this reason we excluded employees with chronic illnesses still finding a significant, positive relationship between telework and presenteeism. Furthermore, employees working solely from home are likely a highly selective group. However, since this group is considered separately in the analyses by using a differentiated categorization, we assume to adequately adjust for potential biases. Additionally, we are not able to control for self-selection and unobserved heterogeneity. In light of this, we performed several robustness analyses, controlling for a wide range of different variables (work engagement, work hours, intensity, work-family-conflict, autonomy, organizational factors, individual variables such as sex, age, self-rated health, educational level, care responsibility, occupation, industry, job-related characteristics). Although the results indicate a quite robust positive relationship between telework and presenteeism, further characteristics, such as personality or job-specific variables, might still bias the results as they are likely related to both, telework as well as presenteeism. Moreover, the study is based on cross-sectional data (EWCS 2015) and relies on self-reports. We therefore cannot rule out that reverse or reciprocal causation between presenteeism and telework drive our results. As mediation analyses require different data, such as longitudinal data, we

considered possible variables that could explain our associations only in terms of controlling for third variables. Thus, we cannot make any statements about the mechanisms, but only about possible confounders. Again, due to the cross-sectional design, we can conclude that teleworkers have a higher tendency to choose presenteeism instead of absenteeism, but we do not know whether they engage in presenteeism on the days they actually work from home. Finally, although the measures of presenteeism in the EWCS are frequently used in presenteeism research, they are also subject to criticism as the measures are subjective and based on retrospective information.<sup>12</sup> Especially sickness presenteeism days may be affected by recall bias as remembering the exact number of sickness presenteeism days during the past 12 months requires a very good memory. However, sickness presenteeism prevalence may be easier to remember (worked despite illness at least once in the past 12 months) and we obtained similar results for both measures.

## CONCLUSION

Having these restrictions in mind, this study makes a first step in providing empirical evidence regarding the association between home-based telework and sickness presenteeism. On the one hand, home-based telework is accompanied with advantages for employees (eg, avoiding commuting time, higher work satisfaction) and it might facilitate working with specific illnesses. In this case, it is important that employees are given the opportunity to adapt their work demands to their health needs and that they are supported by the leaders.<sup>34</sup> On the other hand, it may also increase the risk for self-endangering behavior, which likely endangers health in the long run. Organizations and leaders should therefore be aware of potential health risks associated with telework and should design telework in a way that it aims to reduce the triggers for self-endangering behavior such as presenteeism as far as possible, also taking sex differences into account. As self-endangering work behavior reflect a maladaptive way of coping, individual intervention and stress management trainings that help and prepare employees to deal with new demands in flexible work arrangements might be useful. Trainings for employees and leaders that strengthen individual awareness of their own as well as subordinates' health and clear guidelines in an organization how to deal with presenteeism might help as well.<sup>25</sup> Leaders should further be aware of their function as a role model.<sup>35</sup>

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