

Virtual Work as a Job Demand? Work Behaviors of Public Servants During Covid-19

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The study models the abrupt introduction of virtual work during the COVID-19 pandemic as a job demand within the Job Demands-Resources (JD-R) model. Using survey data from 1,173 public servants collected during the second national lockdown in Germany, we assess the relationships between several job and personal resources with organizational citizenship behavior (OCB), and the relationship between virtual work and counterproductive work behavior (CWB). Additionally, we analyze the moderating role of virtual work for the relationship of resources and OCB, as well as the moderating role of resources for the relationship of virtual work and CWB. Our results show that the direct effects of the resources and the demand for virtual work on workplace behaviors point in the expected direction, while only one out of ten hypothesized interaction effects could be found. These results contribute to theoretical insights about the multiplicative or additive nature of the JD-R model. In addition, virtual work relates positively to both CWB and OCB, which informs the debate about virtual work being a hindrance demand or a positive challenge in the public sector.

Keywords: Virtual Work; COVID-19; Organizational Citizenship Behavior; Counterproductive Work Behavior; Job Demands-Resources Model

Introduction

The pandemic has changed the working conditions of public servants fundamentally. Some faced new and additional tasks, such as police officers having to ensure public compliance with COVID-19 health guidelines. Others were confronted with drastic changes in the way they conducted their usual tasks, such as street level bureaucrats performing citizen interactions online (Schuster et al., 2020). Distancing policies required a rapid switch from personal and paper-based communication to virtual work, i.e. a combination of working from home (i.e. home-based telework; see Bailey & Kurland, 2002) and the use of information and collaboration technologies (i.e. computer-mediated work, see Raghuram et al., 2019). We argue that the abrupt adaptation to virtual work is particularly demanding for public servants, who had to navigate the digital transformation of their jobs, while maintaining the provision of public services (Nguyen & Tuan, 2022).

As of today, the overall effects of the forced digital transformation remain unclear (Philip, 2021). On the one hand, this challenging situation might stimulate public servants to go beyond the formal requirements of their job, i.e. to show extra-role behavior as in organizational citizenship behavior (OCB) (Vigoda-Gadot & Beerli, 2012). Early reports have shown how working from home during COVID-19 relates to higher levels of self-rated productivity and work engagement (Sandoval-Reyes et al., 2021). On the other hand, virtual work often raises productivity concerns from managers, assuming that employees engage in counterproductive work behavior (CWB) such as excessive breaks for dealing with personal issues during office hours (Holland et al., 2016). Indeed, evidence suggests that working from home is associated with greater professional isolation (de Vries et al., 2019) and increased work-life conflicts (Palumbo, 2020), which in turn increase CWB (Liao et al., 2021).

We take these seemingly contradictory results as a starting point for studying both productive (OCB) and counterproductive behaviors (CWB) of public servants during the

pandemic. Our survey in the German public sector (N=1,173) considers several organizational and individual factors, which might explain the varying effectiveness of virtual work. We conceptualize virtual work during COVID-19 as a job demand in the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007). This is because it was introduced abruptly by an external shock (Philip, 2021), was mostly mandatory, often in full-time, and coupled with increased work-family interference due to nursery and school closures (Schuster et al., 2020), as opposed to the voluntary, part-time, pre-pandemic virtual work. The JD-R model provides the theoretical underpinning for studying the relevance of organizational and personal job resources in the relationship between the demand for virtual work and subsequent workplace behaviors.

The study enhances our understanding about which resources are particularly important for stimulating positive and preventing negative behaviors in the context of virtual work. The results also show that virtual work seems to be both a hindrance demand, which positively relates to counterproductive work behavior, and a positive challenge that facilitates organizational citizenship behavior. Furthermore, we find little evidence for moderation effects, which adds to the theoretical debate on the multiplicative versus additive nature of the JD-R model.

The remainder of the paper proceeds as follows. We start with developing the theoretical framework based on the job demands-resources model. After introducing our methodological approach and describing the empirical context, we present the findings of our study. We close with a discussion of theoretical and practical implications and develop directions for future research.

Theory and hypotheses

Job Demands-Resources Model

The theoretical framework of this study is the Job Demands-Resources model (Demerouti et al., 2001). It attributes employee well-being and engagement to the characteristics of a job, which can be classified as either job resources or job demands. Job resources are defined as “those physical, psychological, social, and organizational aspects of the job that may [...] be functional in achieving work goals” (Demerouti et al., 2001, p. 501). Exemplary job resources are support and feedback from colleagues and supervisors (Bakker & Demerouti, 2017; Demerouti et al., 2001). The JD-R model proposes that personal resources play a similar role as organizational resources (Bakker & Demerouti, 2017). Personal resources are unique individual attributes that refer to individuals’ beliefs regarding their ability to successfully control and influence their environment (Bakker & Demerouti, 2017).

Job demands refer to the physical, social, or organizational aspects of the job that “require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs” (Demerouti et al., 2001, p. 501). Typical job demands are high work pressure and emotionally demanding interactions at work (Bakker, 2015; Bakker & Demerouti, 2017). Scholars further differentiated job demands as challenge or hindrance demands, assuming that the former have a motivating potential, while the latter impede goal accomplishment (Gonzalez-Mulé et al., 2021).

Resources and demands induce two psychologically distinct processes, namely a health-impairment process, leading to negative outcomes, and a motivational process, which leads to positive outcomes (Bakker et al., 2007). When job demands exceed the employee’s adaptive capability, they evoke strain, stress, burnout, and negative coping behaviors (Balducci et al., 2011). By contrast, job resources initiate a motivational process, which

increases work engagement and commitment (Demerouti et al., 2001). In addition to the direct effects of job and personal resources and demands on motivation and strain, resources and demands are assumed to interact (Bakker & Demerouti, 2007). For the strain process, job and personal resources are assumed to buffer the negative impact of job demands on job strain (Bakker & Demerouti, 2007). For the motivational process, resources are assumed to gain their motivating potential in the context of high job demands (Bakker & Demerouti, 2017). In other words, the model proposes that job and personal resources are particularly important for inducing desirable outcomes, when individuals face high levels of job demands. The following paragraphs specify the JD-R model for the context of the empirical study.

The health-impairment process

Virtual Work as a Job Demand and Counterproductive Work Behavior

At the onset of COVID-19, the public sector had to digitalize at a rapid pace in order to meet social distancing requirements and to ensure the continuity of service provision (Nguyen & Tuan, 2022; Schuster et al., 2020). The new virtual work-environment suddenly altered everyday routines (Lapierre et al., 2016; van Steenbergen et al. 2018), disrupted social interactions (R. Collins, 2020), and was engrained in the overall stressful pandemic context (Schuster et al., 2020). This was especially demanding for the public sector. Before the pandemic, the share of public servants who worked from home was low (Brenke, 2016; European Commission, 2020), and the use of digital collaboration tools was not widespread (Redlbacher & Hattke, 2022). As an abrupt, externally forced digital transformation (Philip, 2021), we conceptualize virtual work during COVID-19 as a job demand that required public servants' mental energy and time. JD-R theory proposes that within the strain process, highly demanding jobs have negative consequences such as stress and, ultimately, burnout (Bakker & Demerouti, 2017). A behavioral manifestation of job stress are counterproductive work

behaviors (Fox et al., 2001). Counterproductive behaviors describe intentional violations of organizational norms, most prominently withdrawal (i.e. taking excessive breaks, working less than required by the organization) and production deviance (i.e. purposeful inefficient work; see Dalal et al., 2009; Spector et al., 2006). When studying public sector employees, Balducci and colleagues (2011) found evidence for CWB as a behavioral stress-reaction to job demands.

Research suggests that when exposed to stressors, individuals take longer breaks, or work slower than necessary (i.e., show CWB) as a strategy to avoid further resource loss (Krischer et al., 2010). In the stressor-emotion model of counterproductive work behavior, Spector and Fox (2005) propose that role stressors induce frustration and ultimately CWB. We therefore propose the following:

H1: Virtual work relates positively to CWB.

The moderating role of job and personal resources

The demand for virtual work does not affect all individuals in the same way. The JD-R model proposes that job resources and personal resources can buffer the negative impact of job demands, as they help individuals to cope with the demands in a more productive manner (Bakker & Demerouti, 2017).

Job resources. Lockdowns and social distancing during COVID-19 disrupted social interactions at work. Individuals in the virtual environment worked physically separated and had to rely on digital communication technology (R. Collins, 2020). Digital communication, however, lacks the social proximity of face-to-face communication, with negative consequences for workplace relationships (Allen et al., 2015; Wiesenfeld et al., 2001). The resulting social and professional isolation has been found to be a problem among teleworking

public servants before (de Vries et al., 2019) and during the pandemic (Goldenberg et al., 2021).

Social support from supervisors and co-workers can help individuals to cope with job demands. The quality of the vertical relationship between an employee and the supervisor is commonly studied as Leader-Member Exchange (LMX; see Gerstner & Day, 1997). Supervisors' trust and support can change individuals' perception of job demands and help them to perform better (Bakker et al., 2005; Väänänen et al., 2003). Similarly, co-workers can provide emotional support, help individuals to prioritize tasks, and get their work done in time (Bakker & Demerouti, 2007; Chiaburu & Harrison, 2008). Team-Member Exchange (TMX) describes the quality of such relations among team members (Seers, 1989).

With respect to virtual work, supervisors can provide social structure to mitigate individuals' feelings of isolation (Makarius & Larson, 2017). Meta-analytic results show a negative relationship between supervisor support and CWB (Liao et al., 2021). Further, Smoktunowicz et al. (2015) found that social support from supervisors and co-workers moderates the relationship between job demands and CWB. Similarly, de Vries et al. (2019) found that support from supervisors buffers the negative influence of telework on professional isolation for public servants.

In situations, in which formal leadership is absent or limited, formalized organizational rules can act as substitutes or supplements to leadership (Howell & Dorfman, 1986). Formal rules are often associated with dysfunctional red tape in public organizations (for a critical review, see Pandey, 2021). However, when these rules are helpful for the individual employee and applied consistently (DeHart-Davis, 2009), they provide orientation and guidance in the absence of social interactions. Thus, they should reduce the uncertainty caused by the introduction of virtual work and, therefore, weaken its relationship with CWB.

Taken together, we hypothesize:

H2: Social (LMX, TMX) and structural job resources (functional rules) moderate the relationship between virtual work and CWB so that the relationship is weaker at higher levels of job resources.

Personal resources. Besides environmental factors, the behavioral response to virtual work likely depends on individuals' personal resources (Bakker & Demerouti, 2017). These unique individual attributes can explain why individuals perceive stressors differently, and show different behavioral reactions (Fida et al., 2015).

Vital personal resources are self-efficacy, i.e., the belief about how one's own actions can lead to a desired outcome (Bandura, 1977) and self-discipline, which is defined as "the ability to suppress prepotent responses in the service of a higher goal" (Duckworth & Seligman 2006, p. 199). For many public servants, working with virtual collaboration tools was a new experience (C. Fischer et al., 2022; Redlbacher & Hattke, 2022). This makes it likely that they had to persist through difficulties and overcome obstacles associated with virtual work (Y. Wang & Haggerty, 2011). When virtual work is conducted from home, it lacks the disciplining effect of the traditional office setting, and individuals need to plan and structure their workday independently (Adamovic et al., 2021).

These personal resources can help individuals to cope with the demand for virtual work. Their beliefs in their abilities help them handle possible problems and overcome potential barriers associated with virtual work (Adamovic, 2018; Staples et al., 1999). Individuals who consider themselves as efficacious handle challenging working conditions more constructively, perceive the situation as less stressful, and are thus less likely to show undesirable reactions such as CWB (Fida et al., 2015; Fox et al., 2001; Xanthopoulou et al., 2007). Similarly, self-discipline as an individual's ability to suppress prepotent responses in

favor of a higher goal (Duckworth & Seligman, 2006), helps individuals to focus on a given task and resist distraction (B. Wang et al., 2021). Self-disciplined individuals are less likely to procrastinate (Watson, 2001), which was found to be an important driver of using company time for private purposes when working from home (O’Neill et al., 2014).

Empirically, it has been shown that self-efficacy buffers the negative impact of job demands, i.e., role conflict and role ambiguity, on CWB (Fida et al., 2015), while B. Wang et al. (2021) found that individuals low in self-discipline were more likely to engage in private internet browsing during worktime when working from home during COVID-19.

Consequently, we hypothesize the following:

H3: Personal resources (self-efficacy and self-discipline) moderate the relationship between virtual work and CWB so that the relationship is weaker at higher levels of personal resources.

The motivational process

Job and Personal Resources and Organizational Citizenship Behavior

During the COVID-19 pandemic, working conditions for many public servants changed from one day to the next (Schuster et al., 2020). Scholars have argued that exactly such a rapidly changing environment requires citizenship behaviors that go beyond the formal requirements of the traditional bureaucratic system (Vigoda-Gadot & Beerli, 2012).

Employees who are engaging their work proactively, thinking out-of-the-box, and going beyond established role requirements can contribute to organizational effectiveness in such an extraordinary situation (de Geus et al., 2020). Organizational citizenship behaviors describe extra-role behaviors, such as working longer than required or taking additional

responsibilities, which are not explicitly recognized by the formal reward system (Dalal et al., 2009; Organ, 1988).

Organizational citizenship behavior depends on organizational as well as individual characteristics. Based on social exchange (Blau, 1964) and reciprocity norms (Gouldner, 1960), individuals tend to respond positively when they feel supported by the organization (Wayne et al., 2002). They reciprocate high-quality relationships with supervisors and co-workers by going beyond the formal requirements of their job (Dulebohn et al., 2012; Love & Forret, 2008). At the same time, personal resources (e.g., self-efficacy, self-discipline) enable them to plan for and conduct citizenship behaviors effectively as they help them to structure their workday, and to suppress instinctive and selfish impulses (Beauregard, 2012; Y.J. Wang et al., 2021).

This is in line with empirical evidence, suggesting that organizational characteristics (e.g. LMX, TMX, and functional rules) as well as employee characteristics (e.g. self-efficacy, self-discipline) are antecedents of organizational citizenship behavior (DeHart-Davis et al., 2015; de Geus et al., 2020; Dulebohn et al., 2012; Love & Forret, 2008; Y.J. Wang et al., 2021).

We conclude accordingly:

H4: Social (LMX, TMX) and structural job resources (functional rules) as well as personal resources (self-efficacy, self-discipline) relate positively to OCB.

The moderating role of virtual work

JD-R theory proposes that job and personal resources particularly influence motivation in the context of high job demands (Bakker & Demerouti, 2017). This is based on Hobfoll's (2001) assumption that "all types of resources gain their motivating potential and become

particularly useful when needed” (Bakker & Demerouti, 2017, p. 275) and has found support in empirical studies, too (e.g., Bakker et al., 2007, Hakanen et al., 2005).

Job resources. In the context of the COVID-19 pandemic, where physical distancing policies restricted social contacts to a minimum, social support from supervisors and co-workers is considered as particularly important (B. Wang et al., 2021). Especially individuals who frequently engage in virtual work, are distanced from supervisors and co-workers, and have to rely on virtual rather than face-to-face communication. This social isolation weakens the degree to which individuals feel connected to their organization (Wiesenfeld et al., 2001). This organizational identification, however, plays an important role for their willingness to show OCB (de Geus et al., 2020).

Social support can strengthen the organizational identification by giving employees the feeling of being appreciated and part of a social group, thereby fulfilling their desire to belong (B. Wang et al., 2021; Wiesenfeld et al., 2001). In their study on employees working from home during COVID-19, B. Wang et al. (2021) found that social support positively affects performance and well-being via its positive impacts on virtual work challenges such as loneliness. Consequently, we argue that for individuals who face high levels of pandemic virtual work, social support from co-workers and supervisors is especially important for inducing OCB.

Functional rules can serve as a substitute or supplement to leadership (Howell & Dorfman, 1986) and meta-analytic evidence in the substitutes for leadership literature has found that organizational formalization relates positively to employees’ organizational commitment (Podsakoff et al., 1996). In the public sector, organizational formalization is positively related to OCB (Asgari et al., 2008) and this relationship is particularly salient in contexts of uncertainty (R. Fischer et al., 2019), like the COVID-19 pandemic.

Taken together, we argue that social and structural job resources are particularly salient in the (uncertain) context of virtual work for employees' productivity. Therefore, we hypothesize:

H5: Virtual work moderates the relationship of social (LMX, TMX) and structural job resources (functional rules) with OCB so that the relationship is stronger at higher levels of virtual work.

Personal resources. In addition to job resources, personal resources unfold a motivating potential, especially when individuals face high levels of job demands (Bakker & Demerouti, 2017). Owing to the sudden switch to virtual work during COVID-19, public servants' work environment lacked many of the traditional office characteristics. While traditional office settings can help individuals to keep their focus on work-related tasks and act according to the organization's interest, remote work settings lack many of those informal and formal procedures, schedules and monitoring mechanisms (Raghuram et al., 2003). At the same time, adjusting to virtual work often implies overcoming obstacles such as technical problems (Y. Wang & Haggerty, 2011).

When the disciplining effect of the traditional office setting is absent, self-efficacy and self-discipline are particularly important for inducing positive work behavior. They help individuals to structure their work-day, focus on a given task, persist through difficulties, and reach their work goals effectively (Adamovic 2018; Raghuram et al., 2003; Staples et al., 1999).

This is in line with empirical evidence. Studies among teleworkers during COVID-19 show that self-discipline helps individuals to achieve their work goals and serve as an enabler for effective remote work (Adekoya et al. 2022; B. Wang et al., 2021). Raghuram et al. (2003)

found that self-efficacy positively influences teleworkers' proactively planning and organizing their work, and that this relationship is stronger for higher levels of telework.

Based on the argumentation above, we hypothesize the following:

H6: Virtual work moderates the relationship between personal resources (self-efficacy and self-discipline) and OCB so that the relationship is stronger at higher levels of virtual work.

Figure 1 illustrates the relationships assumed in the JD-R model: First, virtual work as a demand negatively relates to CWB. Second, job and personal resources moderate this relationship. Third, job and personal resources relate positively to OCB. Fourth, virtual work as a demand moderates the relationships between resources and OCB.

[Figure 1 near here]

Data and Methods

Study context and sample

We conducted our study in the German public sector. Public administration in Germany is characterized by low digitalization rates (Kuhlmann & Bogumil, 2021). In terms of digital public services, Germany only ranks in the lower middle range of European governments and attitudes towards digital tools only changed to a more positive outlook within the public workforce recently (DESI, 2021; Mergel, 2021). The case of the German public sector could even be described as “forced” digital transformation (see Philip, 2021) since it was mainly involuntary and motivated by the pandemic, executed in a very short time

frame, and accompanied by negative attitudes and stereotypes (Redlbacher & Hattke, 2022). Thus, the context is well suited for studying virtual work as a job demand.

We commissioned a professional online panel provider for distributing an online questionnaire during the second lockdown in mid-December 2020. In total, we surveyed 1,173 individuals working in the German public sector. Respondents were 46 years old on average, which matches the average age of individuals in the public sector in Germany (44.5; Statistisches Bundesamt, 2021). The sample contains 69 percent career civil servants, who pursue life-long careers characterized by protected entry and foreseeable progression within the public service, and 31 percent public employees, who are often recruited from the private sector to fill specific positions (for a distinction, see Hammerschid et al. 2007). This means that career civil servants are overrepresented in our study (35 percent in Germany; see Statistisches Bundesamt, 2021). The gender ratio with 56 percent male and 44 percent female participants again does not match the general German public sector, which consists of 42 percent men and 58 percent women (Statistisches Bundesamt, 2021).

The majority worked full-time (85 percent), mostly in the higher intermediate service (61 percent), followed by intermediate (21 percent), higher (14 percent), and lower services (3 percent), with roughly one-third occupying a leadership position (30 percent). Before the pandemic, the majority (78 percent) never or barely worked from home. During COVID-19, this number decreased to 37 percent. At the same time, the share of participants working from home daily or several times per week increased from 15 percent before COVID-19 to 49 percent in December 2020. Table 1 presents sample characteristics of categorical variables. Table A1 (Appendix) presents descriptive characteristics and correlations.

[Table 1 near here]

Measures

We used established multi-item scales to assess job resources, the job demand, and the work behaviors. Participants rated their level of agreement on five-point Likert scales, ranging from “disagree” (1) to “strongly agree” (5), except for virtual work, which indicated a frequency ranging from “never” (1) to “daily” (5).

We measured each of the two dependent variables, OCB and CWB, with a three-item scale (Dalal et al., 2009). Participants reported their degree of agreement with items such as “I volunteer for additional work tasks.” for OCB and “I take unnecessary breaks.” for CWB.

We assessed LMX and TMX with scales from Yáñez Morales et al. (2020), containing items like “My line manager considers my opinion when there is any difficulty at work” (LMX) and “We [the team] basically share necessary information to get our job done” (TMX). Functional rules were assessed by an inverted red tape scale (van Loon et al., 2016), e.g., “the organizational rules that affect my work during the pandemic contribute to the goal of my job activities”.

We measured self-efficacy with three items from Beierlein et al. (2012), for instance “I can usually solve even challenging and complex tasks well” and gathered self-discipline with a multi-item scale from Hogan & Hogan (1992) with (reversed) items such as “I like to put off unpleasant things”. Items from Chudoba et al. (2005) indicated the level of virtual work during COVID-19 with one item each for how often participants worked from home, with digital collaboration tools, and with mobile devices during the pandemic.

We conducted an exploratory factor analysis (EFA), using the psych package (version 2.2.5) in R (Revelle, 2022) to identify clusters of variables. Based on the results (Table A2, Appendix), we extracted 8 distinct and separate constructs. The factor loadings ranged from .394 to .966, with Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) equal to .81 ($p < .001$). Reliability tests yielded coefficient alphas between 0.67 and 0.90 (Table A1,

Appendix). We z-standardized all continuous variables to obtain comparable effect sizes in the path models.

In addition to these variables, we included some single-item control variables in our analysis (Spector & Brannick, 2011). Emerging evidence suggests that COVID-19 promoted traditional gender roles, leading to intensified domestic workloads for women (Adisa et al., 2021, C. Collins et al., 2021). Consequently, we included *gender* as a control variable.

Favorable *working conditions at home* (e.g. working without distraction, adequate technology) have been shown to influence individuals' adjustment to pandemic telework (Carillo et al., 2021). Especially since virtual work during COVID-19 was coupled with increased work-family interference due to nursery and school closures (Schuster et al., 2020).

We also controlled for *age*, because older people tend to have lower levels of digital competencies (Ertl et al., 2020), and, thus, might perceive the switch to virtual work as more demanding. Assuming that individuals' perception of virtual work also depends on how convenient they perceive the information and communication technology (ICT) provided by the provided (Ulfert et al., 2022), we further controlled for *ease of use of ICT* (Goodhue, 1998).

Recent evidence from the public sector suggests that the sudden switch to virtual work during COVID-19 was particularly demanding for supervisors, as they had to provide extensive social and emotional support to their employees (Dandalt, 2021; C. Fischer et al., 2022). Thus, we asked respondents for *leadership responsibilities*. We also controlled for *type of employment* since promotion opportunities and job security differ between (career) civil servants and (position-based) public employees, which likely affects workplace behaviors. As previous research has found that base pay level is positively related to self-reported work performance (Kuvaas, 2006), we included *pay level* as a control variable. We further gathered the *scope of contract* (i.e. full-time and part-time), since the switch to virtual work might be

particularly demanding for public servants who work full-time as opposed to part-time workers, who are possibly less involved in redesigning the workplace.

Finally, we accounted for the *administrative branch* (e.g., tax administration, social services administration) and the *frequency of citizen contact* assuming that different jobs and services have been differently affected by the introduction of virtual work. Virtual work might have been particularly demanding for positions with frequent citizen contact (Schuster et al., 2020).

Results

We calculated six regression models (see Tables 2 and 3), three for each of the dependent variables (1-3 for CWB and 4-6 for OCB). For CWB, Model 1 includes the job demand without the interaction. Model 2 adds the job and personal resources and the interaction terms, and Model 3 comprises the job demand, job and personal resources, interaction terms, and control variables. For OCB, Model 4 includes job and personal resources without the interaction. Model 5 adds the job demand and the interaction terms, and Model 6 comprises job and personal resources, the job demand, interaction terms, and control variables.

[Table 2 near here]

In the job-strain path, H1 proposed that virtual work positively relates to CWB. The relationship between virtual work and CWB is statistically significant ($b = .10$; $p < 0.01$), supporting H1. According to H2, social (LMX, TMX) and structural job resources (functional rules) moderate the relationship between virtual work and CWB so that the relationship is weaker at higher levels of job resources. All interaction terms are not significant ($p > .05$) thus we reject H2 completely. H3 stated that personal resources (self-efficacy and self-discipline) moderate the relationship between virtual work and CWB so that the relationship

is weaker at higher levels of job resources. The interaction term between self-discipline and virtual work is statistically significant ($b = -.05$; $p < .05$), while the interaction term between self-efficacy and virtual work is not ($p > .05$). Accordingly, self-discipline buffers the impact of virtual work on public servants' CWB, partially confirming H3. Figure 2 illustrates the interaction effect of self-discipline and virtual work for CWB.

[Table 3 near here]

[Figure 2 near here]

Regarding the motivational path, H4 stated that social (LMX, TMX) and structural job resources (functional rules) as well as personal resources (self-efficacy, self-discipline) positively relate to OCB. The results in Table 3 partially confirm H4 showing that LMX ($b = .12$; $p < .01$), functional rules ($b = .16$; $p < .001$), and self-discipline ($b = .17$; $p < .001$) are significantly related to OCB, while TMX and self-efficacy are not ($p > .05$). According to H5, virtual work moderates the relationship of social (LMX, TMX) and structural job resources (functional rules) with OCB so that the relationship is stronger at higher levels of virtual work. We dismiss H5 as these interaction terms are statistically insignificant ($p > .05$). We further reject H6, which assumed a moderating role of virtual work in the relationship between personal resources (self-efficacy and self-discipline) and OCB due to insignificant interaction terms ($p > .05$).

The hypothesized effects remain consistent when control variables are added (Models 3 and 6). Model 3 further indicates that older ($b = -.10$; $p < .001$) as well as female respondents ($b = -.10$; $p < .05$) showed lower levels of CWB than younger and male respondents. Model 6 shows that perceived ease of use of ICT negatively relates to OCB ($b = -.06$, $p < .05$) and that older employees reported significantly lower levels of OCB than younger employees ($b = -.06$; $p < .05$). Civil servants reported lower levels of OCB than

public employees ($b = -.16$; $p < .01$), while more frequent citizen contact positively related to OCB ($b = .08$; $p < .01$).

It is noteworthy that the direct effect in Model 4 shows that the demand for virtual work is not only positively related to CWB, as hypothesized, but is also significantly positively related to OCB ($b = .23$; $p < .001$), suggesting contradictory effects. Moreover, Model 2 shows that of the job and personal resources LMX ($b = -.08$; $p < .05$), TMX ($b = -.10$; $p < .01$), and self-discipline ($b = -.57$; $p < .001$) are significantly negatively related to CWB, while functional rules positively relates to CWB ($b = .05$; $p < .05$).

Discussion

In this study, we investigated workplace behaviors during the forced and abrupt introduction of virtual work during COVID-19 drawing on JD-R theory. On the job demand side, we found that virtual work is directly positively related to both counterproductive work behavior and organizational citizenship behavior. Resources did not buffer the negative effect of virtual work on CWB except for an individual's self-discipline, which was relevant for mitigating CWB in the context of virtual work. For the resources, we found that social support was associated with lower CWB (both, LMX and TMX) and increased OCB (only LMX). Structural support in the form of functional rules was associated with increased CWB and OCB, while self-discipline related negatively to CWB and positively to OCB. Virtual work did not amplify the importance of the investigated resources for OCB. Overall, effect sizes of the regression models were rather small, which is in accordance with meta-analytic findings both on telework (Gajendran & Harrison, 2007) and the JD-R model (Gonzalez-Mulé et al., 2021).

Theoretical Implications

The non-findings in regards to the interaction between the demand and resources add to the theoretical discussion about the nature of the JD-R model. In formulating our hypotheses, we followed the multiplicative approach, which proposes that resources and demands interact with each other in their impact on individual outcomes (Bakker & Demerouti, 2017). Based on this common conceptualization and on previous empirical evidence (Bakker et al., 2007; Hakanen et al., 2005), we hypothesized that job and personal resources become more salient in the context of the demand virtual work in their effect on positive work behavior and that the same resources could buffer the negative effect of virtual work on negative work behaviors. However, our results do not support the proposed interaction effects of resources and the demand in their relationship with employees' work behavior. Previous research in the context of telework has found some interaction effects of demands and resources (Lapierre et al., 2016), while empirical evidence in the public sector more generally has been mixed (Potipiroon & Faerman, 2020; Shim et al., 2019). Taken together, these findings support the assertion of a recent meta-analysis (Gonzalez-Mulé et al., 2021), that the JD-R model seems to be additive in most cases, not multiplicative, meaning that the effects of resources and demands generally do not interact with each other, but rather only have main effects on individual outcomes.

The finding that virtual work positively relates to both OCB and CWB may be called 'paradoxical' (Boell et al., 2016), yet it may also help explaining the mixed results of previous research on forced virtual work (Van Steenbergen et al., 2018) and on virtual work in the public sector (de Vries et al., 2019). The twofold effect of virtual work can be. Virtual work challenges traditional forms of managerial control, based on employees' presence and visibility, which are still prevalent in highly bureaucratic systems (Taskin & Edwards, 2007). The traditional presence culture and a certain degree of mistrust hampered the adoption of

telework before the pandemic (Brenke, 2016; C. Fischer et al., 2022; Kaplan et al. 2018).

Unfortunately, our results cannot disprove these concerns, yet they do show that virtual work has positive effects on work behaviors, as well.

A possible explanation for this seemingly paradoxical pattern lies in the conceptualization of job demands, which have been further differentiated into challenge demands and hindrance demands (Gonzalez-Mulé et al., 2021). Through the lens of the transactional theory of stress and coping (Lazarus, 1966; Lazarus & Folkman, 1984), we can see that while the stressor virtual work stays the same, the individual's appraisal of this stressor as a negative hindrance demand or a positive challenge determines its impact. As a hindrance demand, virtual work obstructs goal accomplishment and is more strongly associated with strain (Gonzalez-Mulé et al., 2021), requiring employees to apply coping strategies. In our study, the only successful coping mechanism to reduce CWB, is self-discipline. As a positive challenge, virtual work has the potential to motivate employees to exert their freedom from traditional forms of control. In our study, this potential reveals itself in the increased extra-role behavior public employees report in the setting of virtual work. Comparing the effect sizes shows that while both effects are weak, the positive relationship of virtual work to OCB is stronger than its positive relationship to CWB, indicating, that public employees seem to appraise virtual work more frequently or more strongly as a positive circumstance as opposed to a negative stressor that requires coping.

Practical Implications

Successful virtual work hinges on organizational resources and individual ability. Considering that the public sector lags the private sector in the digital transformation, the need for social distancing afforded an opportunity for implementing digital means of working quickly and for a large proportion of employees. Public services proved to be resilient and

telework was less demanding on employees than previously feared (C. Fischer et al., 2022). So, despite fears of slacking and the general high demands of the COVID-19 pandemic on individuals' energy and resources, public servants still seem willing and able to exert extra effort in the context of virtual work. This seems to be especially true for public employees, who have reported significantly higher OCB than career civil servants. A stronger emphasis on individual performance in the position-based system or rather the lack of organizational rewards in the career-based system could be the cause of the observed difference (Audenaert et al. 2019; Hattke et al., 2021). In the future, virtual work should be incorporated as a measure to motivate employees who are able and would like to work more remotely. While it poses a challenge, leaders and human resource managers can be encouraged that the existing organizational job resources are equipped to keep counterproductive work behavior at bay and increase productive work behavior both in the office and at home. As meta-analytic findings suggest that high intensity virtual work accentuates both beneficial and harmful individual outcomes (Gajendran & Harrison, 2007), it might be reasonable to keep the extent of virtual work at moderate intensity and combine working from home and with digital means with working at the office. In addition, individuals differ in their abilities to manage the autonomy that comes with virtual work practices. According to our study, self-discipline should be the main criterion for selecting employees for virtual work and organizations should focus on developing individuals' self-discipline (B. Wang et al., 2021).

Limitations and Future Research

Some limitations need to be considered when discussing the results of this study. First, our discussion entails the risk of type 2 errors due to the insignificant moderation results. For example, Germany already was in its second lockdown phase during our data collection, meaning that participants answered the survey while already having experienced virtual work.

Next to the theoretical arguments in favor of the additive model, this could be another explanation as to why we found so few interaction effects of the resources with the demand for virtual work. Nonetheless, our null findings relate to theoretical debates and are thus of value for advancing JD-R research, also because they help mitigating the “file drawer problem” (Franco et al., 2014). Second, we can only theorize causal relationships due to the cross-sectional design and the lack of a counterfactual. Still, the interaction effects remain unaffected by this design choice (Brambor et al., 2006; Ganzach, 1998). Experimental studies should address the moderation hypotheses in the JD-R model, which are a rare exception so far (Bakker & Demerouti, 2017). Third, we surveyed a random sample of German public servants, which is not representative for the German public sector. International comparisons based on representative samples are needed to further establish the robustness of our findings. Such studies could also consider individual job characteristics (e.g., job autonomy, task interdependence) to differentiate between job profiles within the various public services. Future research should also integrate longitudinal designs for investigating long-term effects of implementing virtual work in the public sector. Diary studies could shed light on the day-to-day variation of employees’ (counter)productive work behavior. Further, researchers could experimentally test possibilities to train public sector employees’ capabilities to work through digital and virtual means.

Conclusion

The turbulent times of the pandemic have shown that public organizations can be flexible in their daily routines. However, the overall effects of the forced digital transformation have remained unclear (Philip, 2021). Our empirical results show that virtual work has multiple and diverging effects, as it relates to both extra-role engagement and counterproductive behavior. The results also enhance our understanding about which resources are particularly

important for stimulating positive and preventing negative behaviors in the context of virtual work. We further find that the direct effects of the resources and demands on work behavior are much more robust than the interaction effects, which lends support for an additive interpretation of the JD-R model (Gonzalez-Mulé et al., 2021).

This provides scientific evidence for public managers, who had to consult anecdotal evidence (see Bilotta et al., 2021), business surveys (Yang et al., 2022), or research from before the crisis (de Vries et al., 2019) on how to support employees in a virtual work-environment. Unfortunately, our results suggest that there is little they can do to facilitate positive outcomes and reduce negative side-effects – aside from selecting self-disciplined public servants. Social support is of vital importance for mitigating counterproductive behaviors, regardless of the extent of virtual work, which supports calls for public governance to be more trust-based instead of control-fixated (Ansell et al., 2021).

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Tables

Table 1. Sample Characteristics (N=1,173).

Variable	Value	(%)
<i>Gender</i>		
Female	517	(44 %)
Male	656	(56 %)
<i>Occupational Status</i>		
Civil Servant	806	(69 %)
Public Employee	367	(31 %)
<i>Leadership Responsibilities</i>		
Yes	353	(30 %)
No	820	(70 %)
<i>Contract</i>		
Full-time	1,002	(85 %)
Part-time	171	(15 %)
<i>Pay Group</i>		
Lower service	36	(3 %)
Intermediate service	247	(21 %)
Higher intermediate service	720	(61 %)
Higher service	170	(14 %)
<i>Administrative Branch</i>		
Public safety administration	543	(46 %)
Social services administration	230	(20 %)
Public sector regulatory administration	44	(4 %)
Social, economic, and cultural steering administration	53	(5 %)
Tax administration	45	(4 %)
Public services administration	174	(15 %)
Other administration	84	(7 %)

Table 2. Regression Results CWB.

	(1)	(2)	(3)	
	<i>Estimates</i>		<i>Estimates</i>	
Intercept	0.00 (0.03)	0.01 (0.02)	0.05 (0.08)	
Virtual Work	0.10*** (0.03)	0.13*** (0.02)	0.14*** (0.03)	
LMX		-0.08* (0.03)	-0.08* (0.03)	
TMX		-0.11***(0.03)	-0.10***(0.03)	
Functional rules		0.05* (0.02)	0.06* (0.02)	
Self-efficacy		-0.03 (0.03)	-0.03 (0.03)	
Self-discipline		-0.57***(0.03)	-0.54***(0.03)	
LMX x Virtual work		-0.03 (0.03)	-0.03 (0.03)	
TMX x Virtual work		0.02 (0.03)	0.03 (0.03)	
Functional rules x Virtual work		-0.01 (0.02)	-0.02 (0.02)	
Self-efficacy x Virtual work		-0.00 (0.03)	0.00 (0.03)	
Self-discipline x Virtual work		-0.05* (0.02)	-0.06* (0.02)	
Age			-0.10***(0.02)	
Female			-0.10* (0.05)	
Social services administration			-0.14* (0.06)	
Observations	1,173	1,173	1,173	
R ² / R ² adjusted	0.01 / 0.01	0.42 / 0.41	0.44 / 0.42	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Note. Standard errors are in parentheses. Non-significant effects for the control variables were excluded from this table. Full models can be found in Table A3 (Appendix).

Table 3. Regression Results OCB.

	(4)		(5)		(6)	
	<i>Estimates</i>		<i>Estimates</i>		<i>Estimates</i>	
Intercept	0.00	(0.03)	0.00	(0.03)	0.02	(0.10)
LMX	0.12**	(0.04)	0.06	(0.04)	0.06	(0.04)
TMX	-0.01	(0.04)	0.02	(0.04)	0.04	(0.04)
Functional rules	0.16***	(0.03)	0.15***	(0.03)	0.15***	(0.03)
Self-efficacy	0.05	(0.03)	0.04	(0.03)	0.06	(0.03)
Self-discipline	0.17***	(0.03)	0.18***	(0.03)	0.18***	(0.03)
Virtual work			0.23***	(0.03)	0.22***	(0.03)
LMX x Virtual work			0.01	(0.04)	0.01	(0.04)
TMX x Virtual work			0.02	(0.04)	0.02	(0.04)
Functional rules x Virtual work			0.00	(0.03)	0.00	(0.03)
Self-efficacy x Virtual work			0.00	(0.03)	0.01	(0.03)
Self-discipline x Virtual work			0.00	(0.03)	0.00	(0.03)
Ease of use					-0.06*	(0.03)
Age					-0.06*	(0.03)
Civil servant					-0.16**	(0.06)
Citizen contact					0.08**	(0.03)
Observations	1,173		1,173		1,173	
R ² / R ² adjusted	0.16 / 0.16		0.16 / 0.16		0.19 / 0.17	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Note. Standard errors are in parentheses. Non-significant effects for the control variables were excluded from this table. Full models can be found in Table A4 (Appendix).

Figures

Figure 1. Conceptual Model

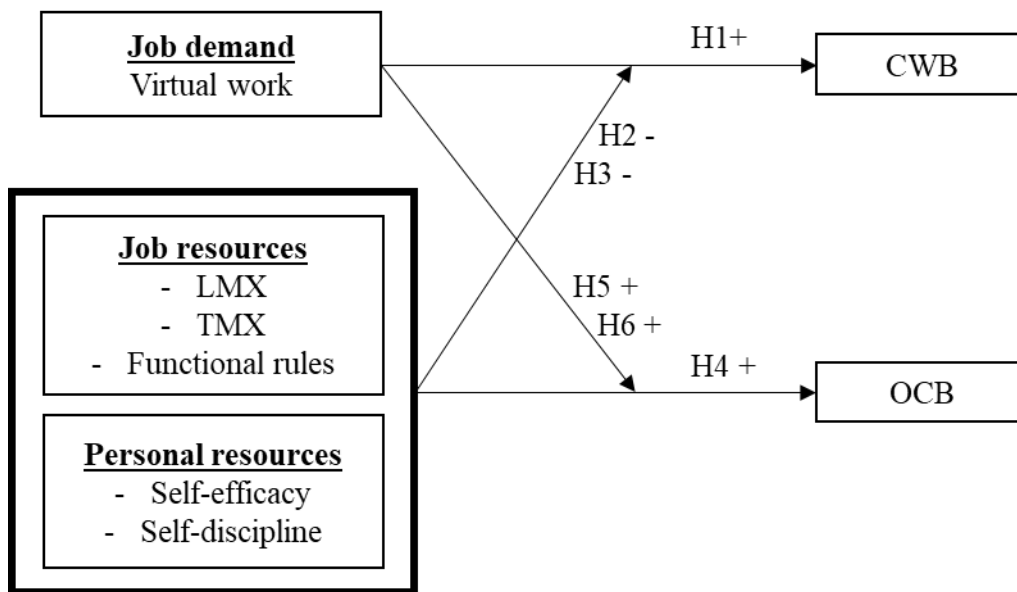
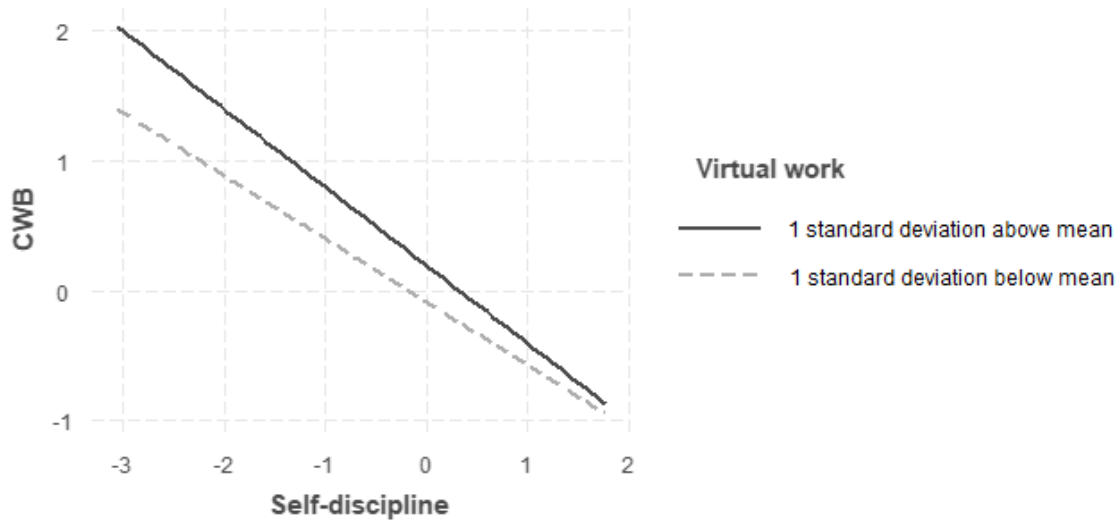


Figure 2. Interaction of self-discipline and virtual work for CWB



Appendix

Table A1. Descriptive Statistics and Correlation Matrix

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 OCB	3.15	0.95	<i>0.78</i>														
2 CWB	1.87	0.87	-0.24***	<i>0.84</i>													
3 LMX	3.76	0.99	0.17***	-0.15***	<i>0.89</i>												
4 TMX	4.09	0.84	0.15***	-0.20***	0.51***	<i>0.84</i>											
5 Functional rules	3.29	0.91	0.18***	-0.06*	0.26***	0.23***	<i>0.81</i>										
6 Self-efficacy	4.22	0.71	0.15***	-0.27***	0.22***	0.32***	0.15***	<i>0.90</i>									
7 Self-discipline	3.69	0.74	0.15***	-0.39***	0.11***	0.15***	0.10***	0.35***	<i>0.67</i>								
8 Virtual work	3.15	1.26	0.21***	0.07*	0.18***	0.06*	0.09**	0.05	0.00	<i>0.79</i>							
9 Good Working Conditions at Home	3.49	1.34	0.17***	-0.04	0.17***	0.13***	0.09**	0.15***	0.09**	0.45***	n/a						
10 Ease of use	3.51	1.10	0.08*	-0.05	0.23***	0.16***	0.29***	0.13***	0.09**	0.18***	0.23***	n/a					
11 Age	45.68	10.55	-0.03	-0.24***	-0.03	0.03	0.07*	0.11***	0.22***	-0.08**	-0.02	0.05	n/a				
12 Female ^a	0.44	0.50	0.07*	-0.06*	0.05	0.06*	0.04	0.01	0.01	0.01	0.00	0.08**	-0.14***	n/a			
13 Leadership responsibilities ^b	0.30	0.46	0.05	-0.07*	0.09**	0.08**	0.05	0.07*	0.06*	0.12***	-0.00	0.03	0.15***	-0.13***	n/a		
14 Pay group	2.87	0.68	0.08**	-0.06	0.16***	0.17***	-0.04	0.14***	0.06*	0.32***	0.20***	0.04	0.00	-0.06	0.27***	n/a	
15 Citizen contact	3.19	1.50	0.02	0.04	-0.15***	-0.07*	-0.04	-0.09**	-0.04	-0.17***	-0.19***	-0.15***	-0.07*	-0.01	-0.00	-0.09**	n/a

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Note. N = 1,173; Cronbach's alpha is in the main diagonal (in italics); n/a = not applicable; a. 0 = male, 1 = female; b. 0 = no, 1 = yes.

Table A2. Results of exploratory factor analysis.

Dimension	Survey items	Factor loadings
Leader-member exchange (LMX)	<i>“Please think of the interactions with your line manager. Please indicate in how far you personally agree with the following statements. During COVID-19...”</i>	
	... my line manager would defend me to others in the organization if I made a mistake.	.832
	... there is a mutual respect in my relationship with my line manager.	.869
Team-member exchange (TMX)	<i>“Please think of the interactions with your colleagues. Please indicate in how far you personally agree with the following statements. During COVID-19...”</i>	
	... we basically share necessary information to get our job done.	.819
	... we help each other out at work when needed.	.941
Functional rules	<i>“Please indicate in how far you personally agree with the following statements on organizational rules. The rules which concern my job during COVID-19...”</i>	
	... have a clear function for my job activities.	.644
	... contribute to the goal of my job activities.	.872
Self-efficacy	<i>“Please indicate in how far you personally agree with the following statements.”</i>	
	I can rely on my own abilities in difficult situations.	.876
	I am able to solve most problems on my own.	.812
Self-discipline	<i>“Please indicate in how far you personally agree with the following statements.”</i>	
	I complete new tasks immediately.	.396
	I like to put off unpleasant things. (reversed)	.955
Organizational citizenship Behavior (OCB)	<i>“Please indicate in how far you personally agree with the following statements. During COVID-19...”</i>	
	... I go above and beyond what is required for the work task.	.922
	... I choose to work rather than to take a break.	.683
Counterproductive work behavior (CWB)	<i>“Please indicate in how far you personally agree with the following statements. During COVID-19...”</i>	
	... I persist enthusiastically in completing a task.	.632
	... spend time on private tasks during work time.	.712
Virtual work	<i>“How often do you currently, during COVID-19, work ...”</i>	
	... take unnecessary breaks.	.962
	... work slower than necessary.	.746
	... with people via internet-based conferencing applications?	.659
	... with mobile devices?	.779
	... at home during normal business days?	.792

Note. Extraction method: maximum likelihood; rotation method: Promax; factor loadings < .30 are not displayed.

Table A3. Full Regression Results CWB

	(1)	(2)	(3)			
	<i>Estimates</i>		<i>Estimates</i>			
Intercept	0.00	(0.03)	0.01	(0.02)	0.05	(0.08)
Virtual work	0.10***	(0.03)	0.13***	(0.02)	0.14***	(0.03)
LMX			-0.08*	(0.03)	-0.08*	(0.03)
TMX			-0.11***	(0.03)	-0.10***	(0.03)
Functional rules			0.05*	(0.02)	0.06*	(0.02)
Self-efficacy			-0.03	(0.03)	-0.03	(0.03)
Self-discipline			-0.57***	(0.03)	-0.54***	(0.03)
LMX x Virtual work			-0.03	(0.03)	-0.03	(0.03)
TMX x Virtual work			0.02	(0.03)	0.03	(0.03)
Functional rules x Virtual work			-0.01	(0.02)	-0.02	(0.02)
Self-efficacy x Virtual work			-0.00	(0.03)	-0.00	(0.03)
Self-discipline x Virtual work			-0.05*	(0.02)	-0.06*	(0.02)
Good working conditions at home					-0.02	(0.03)
Ease of use					0.01	(0.02)
Age					-0.10***	(0.02)
Female ^a					-0.10*	(0.05)
Leadership responsibilities ^b					-0.02	(0.05)
Civil servant ^c					0.02	(0.05)
Full-time ^d					0.04	(0.07)
Pay group					-0.02	(0.03)
Social services administration ^e					-0.14*	(0.06)
Public sector regulatory administration ^e					0.12	(0.12)
Social, economical and cultural steering administration ^e					0.12	(0.11)
Tax administration ^e					0.21	(0.12)
Public services administration ^e					-0.08	(0.07)
Other administration ^e					0.01	(0.09)
Citizen contact					0.01	(0.02)
Observations	1,173		1,173		1,173	
R ² / R ² adjusted	0.01 / 0.01		0.42 / 0.41		0.44 / 0.42	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Note. Standard errors are in parentheses. N = 1,173; a. 0 = male, 1 = female; b. 0 = no, 1 = yes; c. 0 = public employee, 1 = civil servant; d. 0 = part-time, 1 = full-time, e = reference group: Public safety administration.

Table A4. Full Regression Results OCB

	(1)	(2)	(3)			
	<i>Estimates</i>		<i>Estimates</i>			
Intercept	0.00	(0.03)	0.00	(0.03)	0.02	(0.10)
LMX	0.12**	(0.04)	0.06	(0.04)	0.06	(0.04)
TMX	-0.01	(0.04)	0.02	(0.04)	0.04	(0.04)
Functional rules	0.16***	(0.03)	0.15***	(0.03)	0.15***	(0.03)
Self-efficacy	0.05	(0.03)	0.04	(0.03)	0.06	(0.03)
Self-discipline	0.17***	(0.03)	0.18***	(0.03)	0.18***	(0.03)
Virtual work			0.23***	(0.03)	0.22***	(0.03)
LMX x Virtual work			0.01	(0.04)	0.01	(0.04)
TMX x Virtual work			0.02	(0.04)	0.02	(0.04)
Functional rules x Virtual work			0.00	(0.03)	0.00	(0.03)
Self-efficacy x Virtual work			0.00	(0.03)	0.01	(0.03)
Self-discipline x Virtual work			0.00	(0.03)	0.00	(0.03)
Good working conditions at home					0.05	(0.03)
Ease of use					-0.06*	(0.03)
Age					-0.06*	(0.03)
Female ^a					0.05	(0.06)
Leadership responsibilities ^b					0.06	(0.06)
Civil servant ^c					-0.16**	(0.06)
Full-time ^d					-0.01	(0.08)
Pay group					-0.00	(0.03)
Social services administration ^e					0.12	(0.08)
Public sector regulatory administration ^e					0.19	(0.15)
Social, economical and cultural steering administration ^e					0.09	(0.13)
Tax administration ^e					0.05	(0.14)
Public services administration ^e					0.13	(0.08)
Other administration ^e					-0.03	(0.11)
Citizen contact					0.08**	(0.03)
Observations	1,173		1,173		1,173	
R ² / R ² adjusted	0.11 / 0.11		0.16 / 0.16		0.19 / 0.17	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Note. Standard errors are in parentheses. N = 1,173; a. 0 = male, 1 = female; b. 0 = no, 1 = yes; c. 0 = public employee, 1 = civil servant; d. 0 = part-time, 1 = full-time, e = reference group: Public safety administration.