Polluted work: A self-control perspective on air pollution appraisals, organizational citizenship, and counterproductive work behavior

Ryan Fehr a, Kai Chi Yam b, Wei He c, Jack Ting-Ju Chiang d, Wu Wei e,⇑

⇑ a Department of Management, Michael G. Foster School of Business, University of Washington, Seattle, WA 98195, United States
b Department of Management and Organization, National University of Singapore, Singapore
c School of Business, Nanjing University, Nanjing, China
d Guanghua School of Management, Peking University, Beijing, China
e Economics and Management School, Wuhan University, Wuhan, China

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In rapidly developing nations such as China, air pollution is a growing concern. Nonetheless, theory and data on the impact of air pollution on employee behavior are essentially nonexistent. In this paper we employ a diary methodology to examine the within-individual effects of air pollution appraisals on employees' daily self-control resources and behavior. Multilevel data collected across two weeks from 155 employees located in urban China indicate that appraisals of air pollution severity deplete employees' self-control resources. This depletion in turn mediates the effects of air pollution appraisals on employee behavior, resulting in decreased organizational citizenship behavior and increased counterproductive work behavior. In support of the depletion perspective, the effects of air pollution appraisals are moderated by employees' trait self-control, and hold even after controlling for employees' daily negative affectivity and objective levels of air pollution. Implications for future research and practice are discussed.

1. Introduction

Over the past several decades, industrialization has spread rapidly throughout the world. In China, the transition to an industrialized economy has been particularly dramatic (Johnson, 2013). Industrialization and urbanization have improved access to education, healthcare, and jobs, lifting millions of people out of poverty. Yet these trends have also brought many challenges, one of the most acute of which is air pollution. According to air quality standards issued by the European Union, only 1% of China's 560 million city dwellers breathe air that is safe (Kahn & Yardley, 2007). China's Prime Minister has since vowed to “declare war against pollution” (Tatlow, 2014).

Empirical research has primarily focused on air pollution's health effects. Studies show that air pollution causes breathing difficulties, damages the lungs, and strains the cardiovascular system (Dockery & Pope, 1994; Gurugeira, Lawrence, Coull, Murthy, & Gonzalez-Flecha, 2002; Seaton, Godden, MacNee, & Donaldson, 1995). Data from the World Health Organization suggest that air pollution accounts for millions of deaths each year, 88% of which occur in developing countries (World Health Organization, 2014). In China, 1.6 million people die from air pollution every year (Amos, 2016). Organizations such as the United Nations have in turn identified air pollution as a critical threat to global health (United Nations, 2014).

Although scholars have effectively demonstrated the health implications of air pollution in China and beyond, the literature is limited in important ways. First, scholars have tended to focus on objective air pollution metrics while ignoring the psychological experience of air pollution (i.e. individuals' appraisals of air pollution severity at a given point in time). Past research has demonstrated the unique importance of cognitive appraisals of potentially threatening stimuli, initiated by but distinct from the stimuli themselves (Lazarus, 1968; Lazarus & Folkman, 1984). This suggests a need to study how individuals appraise the pollution in the air on a daily basis and the unique effects of these appraisals. Second, scholars have tended to focus on air pollution's health effects while ignoring its psychological effects. Initial evidence suggests that air pollution is not only a problem for physical health, but can also act as a potent psychological stressor, with implications that are in need of study (Kondo et al., 2014). Finally, scholars have tended to ignore the implications of air pollution for the...
workplace, overlooking air pollution's effects on employees' daily behaviors as well as the processes underlying them.

Here, we address these issues by developing a model that integrates ego depletion theory (Baumeister, Bratslavsky, Muraven, & Tice, 1998) and cognitive appraisal theory (Lazarus, 1968) with the literature on the psychology of the natural environment (Herzog, Black, Fountaine, & Knotts, 1997; Kaplan & Kaplan, 1989). Specifically, we argue that daily appraisals of air pollution severity deplete employees' self-control resources, resulting in decreased organizational citizenship behavior (OCB) and increased counterproductive work behavior (CWB). Furthermore, we argue that the relationships among air pollution appraisals, self-control resource depletion, and employees' OCBs and CWBs hinge on employees' trait self-control, such that employees with low trait self-control should be particularly vulnerable to the depleting effects of air pollution appraisals. We test these relationships with a diary study of 155 workers in urban China conducted over the course of ten work days. In this way, we avoid the methodological limitations of cross-sectional surveys and directly model daily fluctuations at the within-individual level (Alliger & Williams, 1993).

In total, we make several key contributions. First, we contribute to research on organizations and the natural environment by demonstrating how air pollution appraisals shape employee outcomes. Second, we contribute to the literatures on depletion, OCBs and CWBs by demonstrating that appraisals of the natural environment can meaningfully affect these phenomena on a daily basis, and by shifting focus from between-level sources of variance to daily, within-level variation (Cortina & Landis, 2009). Finally, we contribute to the management literature in general by answering calls for a more global approach to management research and greater attention to the unique challenges of rapid industrialization and urbanization in China and the developing world (Gelfand, Leslie, & Fehr, 2008; Howard-Grenville, Buckle, Hoskins, & George, 2014; Tsui, 2007). Fig. 1 presents a summary of the theoretical model.

2. Theory and hypotheses

Self-control refers to an individual's capacity to volitionally override, modify, or suppress immediately desirable behavior in the pursuit of long-term goals (DeWall, Baumeister, Galliot, & Maner, 2008). According to ego depletion theory, acts of self-control draw from a common, global energy resource (Baumeister et al., 1998). Unfortunately, these resources are finite and many different forces can impinge upon them. Examples include thought suppression, attentional control, and impulse control (Hagger, Wood, Stiff, & Chatzisarantis, 2010). In the absence of sufficient recovery opportunities individuals become drained of their capacity for self-control, a state which Baumeister and Vohs (2007) refer to as depletion. Within the workplace, scholars have shown that employees' self-control resources are depleted by factors such as emotional labor (Trougakos, Beal, Cheng, Hideg, & Zweig, 2015; Yam, Fehr, Keng-Highberger, Klotz, & Reynolds, 2016), feelings of anxiety (McCarthy, Trougakos, & Cheng, 2016) and perceptions of unkind treatment (Rosen, Koopman, Gabriel, & Johnson, 2016). However, depletion research has mirrored the organizational literature writ large in its tendency to overlook the role of broad contextual forces such as economic conditions, labor markets, time, global events, and political stability (Johns, 2006). Drawing from this contextual perspective, we argue that employees' self-control resources may be depleted by their appraisals of the natural environment that surrounds them.

2.1. The impact of air pollution appraisals

Existing research on the link between self-control resources and the natural environment primarily focuses on the restorative potential of one's surroundings. Most notably, attention restoration theory argues that natural settings (parks, gardens, etc.) restore individuals' capacities for top-down information processing by allowing them to shift to a less intensive, bottom-up processing mode for a period of time (Kaplan & Kaplan, 1989). Put differently, attention restoration theory argues that the natural environment provides "a sense of psychological escape from the demands of directed attention" (Ratcliff, Gatersleben, & Sowden, 2013, p. 222). Empirical support for this perspective is extensive. Both within and beyond the workplace, studies have demonstrated the restorative effects of nature walks (Berman, Jonides, & Kaplan, 2013, p. 222). Empirical support for this perspective is extensive. Shifting from the positive effects of the natural environment to its potential negative effects, we argue that perceptions of polluted surroundings can facilitate resource depletion. In focusing on perceptions of polluted surroundings, we move beyond scholars' tendency to focus solely on objective pollution levels. China's Ministry of Environmental Protection, mirroring other government agencies such as the United States' Environmental Protection Agency, measures air pollution according to the concentration of airborne contaminants in a given area. These include particulate matter, ozone, and carbon monoxide. However, consistent with Lazarus's (1968) cognitive appraisal theory, we argue that the psychological effects of air pollution should more closely relate to how a person appraises the air pollution at a given point in time. As noted by Honold, Beyer, Lakes, and van der Meer (2012), appraisals of the natural environment are complex and multifaceted. They are influenced not only by the physical properties of the environment, but also by personal attributes and situational forces. For example, attention restoration theory argues that natural environments are only restorative when they match an individual's desired range of stimulation (Amério, 2002; Francescato, 2002). An extensive set of factors is likely to contribute to an individual's appraisals of air pollution severity on a given day. Examples include the visibility of pollution in the air, amount of time

![Fig. 1. A summary of the hypothesized effects of air pollution appraisals.](image-url)
spent outdoors, exposure to news stories about air pollution, and the expressed pollution appraisals of one's friends, family, and coworkers.

Looking to existing models of resource depletion (Baumeister & Vohs, 2007; Hagger et al., 2010), air pollution appraisals can be theorized to deplete individuals' self-control resources for at least two reasons. First, undesirable air pollution appraisals should create rumi native thoughts that individuals attempt to suppress. Preliminary research suggests that people find it unpleasant to think about air pollution. Specifically, thoughts of air pollution have been shown to facilitate pessimism and anxiety due to the sense of threat that an unsafe environment produces (Lima, 2004; Marques & Lima, 2011). Anecdotal evidence likewise suggests that the dramatic rise in air pollution in recent years is a potent source of stress, worry, and rumination among residents in polluted urban environments (Zhou & Binglin, 2013). These negative thoughts are likely to motivate thought suppression, as individuals attempt to neutralize their intrusive negative cognitions (Abramowitz, Tolin, & Street, 2001). Paradoxically, such attempts at thought suppression often heighten the cognitive accessibility of the suppressed thought (Wegner, Schneider, Carter, & White, 1987) and ultimately deporate individuals' capacities for further self-control exertion (Gailliot et al., 2007; Muraven & Baumeister, 2000; Yam, Fehr, et al., 2016).

Second, appraisals of air pollution as severe should cause individuals to engage in increased attentional control. Past research suggests that environments are most depleting when they are filled with distractions that require individuals to direct their attention toward some stimuli and screen out others (Kaplan & Kaplan, 1989). For example, urban environments typically require individuals to engage in increased attentional control. Past research suggests that the dramatic rise in air pollution in recent years is a potent source of stress, worry, and rumination among residents in polluted urban environments (Zhou & Binglin, 2013). These negative thoughts are likely to motivate thought suppression, as individuals attempt to neutralize their intrusive negative cognitions (Abramowitz, Tolin, & Street, 2001). Paradoxically, such attempts at thought suppression often heighten the cognitive accessibility of the suppressed thought (Wegner, Schneider, Carter, & White, 1987) and ultimately deporate individuals' capacities for further self-control exertion (Gailliot et al., 2007; Muraven & Baumeister, 2000; Yam, Fehr, et al., 2016).

H1. Appraisals of air pollution as severe are positively related to self-control resource depletion.

2.2. Implications for organizational citizenship and counterproductive work behavior

Hypothesis 1 suggests a direct effect of air pollution appraisals on self-control resource depletion. In this section we consider the implications of this effect for employees' OCBs and CWBs. Broadly defined, OCBs refer to discretionary behaviors that contribute to the effective social and psychological functioning of the organization, but are not formally recognized by the organization's reward system (Organ, Podsakoff, & MacKenzie, 2006). Examples of OCBs include helping a coworker meet an important deadline and taking the expressed pollution appraisals of one's friends, family, and coworkers.

During the workday, ego depletion theory suggests that employees whose capacity for self-control is diminished is particularly likely to engage in counterproductive work behavior – voluntary behaviors that violate an organization's norms and threaten the well-being of the organization and its members (Bennett & Robinson, 2000). Examples of CWBs include working on personal matters during work hours, making fun of another employee, and engaging in verbal aggression. Although these behaviors require effort and action, they are less effortful than their alternatives. In other words, they represent opportunities for employees to engage in behaviors that are immediately rewarding...
but contradict their long-term goals. For example, although an employee must expend some effort to work on a personal matter during the workday, behavior aimed at adhering to the long-term goal of being a productive employee is more effortful and requires more resources (Wagner, Barnes, Lim, & Ferris, 2012). Similarly, although incivility (e.g., making fun of a colleague) requires a certain amount of effort, it is less effortful and requires less willpower than engaging in surface acting or otherwise suppressing one’s hostile emotions and thoughts (Yam, Fehr, et al., 2016).

Multiple empirical studies attest to the link between resource depletion and CWB. Employees who are depleted tend to violate organizational rules and cut corners (Reason, Parker, & Lawton, 1998). In laboratory experiments and field studies, depleted participants frequently succumb to immediate temptations that contradict their ethical principles (Christian & Ellis, 2011; Gino, Schweitzer, Mead, & Ariely, 2011; Welsh, Ellis, Christian, & Mai, 2014). For example, depleted students are more likely to cheat for additional payment on a performance task than students with sufficient self-control resources (Gino et al., 2011; Mead, Baumeister, Gino, Schweitzer, & Ariely, 2009). Similarly, sleep deprived employees are more likely to engage in deviant behavior than well-rested employees as a result of depletion (Christian & Ellis, 2011). For example, Wagner et al. (2012) found that sleep deprivation significantly increases the tendency to cyberloaf at work. Together, these arguments suggest a mediated effect, whereby self-control resource depletion will mediate the effects of air pollution appraisals on counterproductive work behavior. We therefore offer the following hypothesis:

**H3.** Self-control resource depletion mediates the effect of air pollution appraisals on employee counterproductive work behavior.

### 2.3. The moderating role of trait self-control

Hypotheses 1–3 provide an account of the effects of air pollution appraisals on employees’ self-control resources, OCBS, and CWBs. Nonetheless, there are reasons to believe that these effects will vary across individuals. Drawing from ego depletion theory and the interactionist account of organizational behavior (Chatman, 1989; Treviño, 1986), we propose that the negative effects of air pollution will be mitigated for employees who are high on trait self-control.

A central tenet of ego depletion theory is that individuals vary in their susceptibility to resource depletion. This individual difference is captured by trait self-control, which refers to an individual’s general capacity to regulate his or her actions across a range of domains and contexts (Tangney, Baumeister, & Boone, 2004). High trait self-control can be expected to mitigate the depleting effects of air pollution appraisals for two reasons. First, some scholars have argued that individuals with high trait self-control have a higher baseline level of self-control resources than individuals with low trait self-control (Dvorak & Simons, 2009; Muraven, Collins, Shiffman, & Paty, 2005). According to this perspective, high levels of trait self-control should act as a buffer against the negative effects of air pollution appraisals. Second, scholars have argued that individuals with high trait self-control respond to depleting stimuli differently than individuals with low trait self-control, developing behavioral patterns that enable them to steer their attention away from distractions such as air pollution (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). For example, after appraising the air pollution to be severe, individuals with high trait self-control are less likely to engage in persistent thought suppression that would eventually lead to depletion than their counterparts with low trait self-control.

Consistent with these arguments, high trait self-control is associated with a wide array of positive outcomes. Compared to their peers, high self-control individuals are particularly good at maintaining their physical health, are more financially successful, and enjoy higher quality interpersonal relationships (Baumeister, 2002; de Ridder et al., 2012). Most relevant to the current research, past work suggests that high trait self-control individuals are particularly effective at overcoming the depleting effects of their work environments. For example, Schmidt, Hupke, and Diestel (2012) found that trait self-control moderates the link between job-related self-control demands and psychological strain. In studies of leaders, scholars have demonstrated that leaders with high trait self-control are less likely than their peers to be depleted by negative events such as stress-inducing family situations (Kiewitz et al., 2012) and demanding customer interactions (Yam, Fehr, et al., 2016). Taken together, ego depletion theory and past research suggest that trait self-control will attenuate the depleting effects of air pollution appraisals, resulting in the following hypotheses:

**H4a.** The indirect effect of air pollution appraisals on employee organizational citizenship behavior via self-control resource depletion is moderated by employee trait self-control, such that the indirect effect will be mitigated when employees’ trait self-control is high.

**H4b.** The indirect effect of air pollution appraisals on employee counterproductive work behavior via self-control resource depletion is moderated by employee trait self-control, such that the indirect effect will be mitigated when employees’ trait self-control is high.

### 3. Methods

#### 3.1. Research setting

Given our interest in the phenomenon of air pollution appraisals, it was important to choose a setting where air pollution is pervasive. Therefore, the data for this study were collected in Wuhan, China. Wuhan is the capital of the Hubei province, located in central China. It is the most populous city in Central China, with a total population of over 10 million people and an average of 3100 residents per square mile. In addition to its status as Central China’s primary financial and cultural hub, Wuhan also has a thriving manufacturing center and is particularly well-known for its iron and steel production. In 2013 Wuhan reported a GDP of $144 billion, representing a 10.1% rise over the previous year.

Due to factors such as a dense population, a heavy reliance on manufacturing, and an aggressive rate of urban construction (including, for instance, the construction of a 14-line subway system from 2010 to 2020), air pollution is a persistent concern in Wuhan. From January 1st to November 30th, 2014, Wuhan’s daily average air quality exceeded healthy levels on 252 days (PM2.5 > 150) and exceeded hazardous levels on 17 days (PM2.5 > 300), consistent with pollution trends in other large cities such as Beijing and Tianjin. Furthermore, research suggests that the air pollution in Wuhan and other northern cities is particularly hazardous, with recent estimates suggesting an additional loss of 5.5 years of life compared against similar cities in the South due to high levels of toxins in the local coal supply (Chen, Ebenstein, Greenstone, & Li, 2013; see also, Qian et al., 2016). Indeed, news stories documenting citizens’ concerns with the air pollution in Wuhan in recent years are numerous (e.g., Lie, 2014).
3.2. Participants and procedure

A total of 196 individuals employed at nine different companies in Wuhan were contacted by the author team and asked to participate in a daily diary study of workplace experiences. A total of 161 participants agreed to participate, yielding a response rate of 82.1%. Due to significant missing data, six of the returned surveys were unusable, resulting in a final sample of 155 participants (Mage = 32.8; 51.6% male). Participants were involved in a wide array of occupations including administration (40.6%), sales and marketing (28.9%), research and development (21.2%), and production and operations (10.3%). Most (97.4%) had a college education, and worked an average of 43.6 hours per week.

As previously mentioned, we employed a diary design to test our hypotheses. This approach was utilized for two key reasons, one theoretical and one methodological. First, the daily diary approach is most theoretically consistent with narrative accounts of how individuals experience the phenomenon of air pollution. Multiple factors suggest that air pollution appraisals will vary significantly on a daily basis. As previously reviewed, air pollution appraisals on a particular day are likely to be influenced by an array of forces such as subjective perceptions of the density of pollutants in the air, how much time a person spends outdoors, and the expressed appraisals of friends, family, and coworkers (Kim et al., 2004). Second, from a methodological perspective, the daily diary approach allowed us to capture within-individual dynamics while simultaneously examining how time-invariant variables influence these dynamics. As noted by Alliger and Williams (1993), within-individual relationships between psychological and behavioral phenomena might vary significantly as a function of between-individual moderators such as employees’ personalities and perceptions of their jobs. Indeed, several recent studies have noted the particular benefits of examining within-individual dynamics of employees’ OCBs and CWBs, as well as their antecedents (e.g. Wang et al., 2013).

One week prior to the main study, participants completed an entry survey assessing their trait self-control and demographics. Then, participants completed a daily diary study over the course of ten work days, which assessed their daily air pollution appraisals, self-control resource depletion, organizational citizenship behaviors, counterproductive work behaviors, and negative affect. Our choice of ten days is consistent with the existing diary study literature (e.g. Barnes, Lucianetti, Bhave, & Christian, 2015) and Wheeler and Reis’s (1991) recommendation of ten working days as a generalizable sample of participants’ fluctuating work experiences. Participants were instructed to complete the daily surveys after the end of the work day and before going to sleep. On average, participants completed the daily survey at 6:00 pm. We obtained a total of 1532 daily surveys out of a possible 1550, representing a 98.9% daily response rate. This high response rate was facilitated through gifts to participants and consistent communication between the employees’ organizations and the research team during the data collection process. All measures were originally compiled in English. The items and instructions were then translated into Mandarin and back-translated following the recommended procedures of Brislin (1986).

3.3. Focal measures

3.3.1. Air pollution appraisals

We utilized four items to assess participants’ daily air pollution appraisals. Specifically, participants indicated the extent to which they agreed that “Today, the air pollution was (a) severe, (b) bad, (c) extreme, and (d) unbearable” (1 = Strongly Disagree; 7 = Strongly Agree; \( \alpha = 0.98 \)). As a check on the validity of our measure, we examined the correlation between employees’ air pollution appraisals and the PM 2.5 concentration, which assesses suspended particulate matter with a diameter <2.5 µm. The Wuhan measurements are taken at six reporting stations in Wuhan. For each employee, we recorded daily measurements from the station closest to the participant’s place of employment. The correlation between the particulate matter levels and participants’ daily pollution severity ratings was significant, \( r = 0.25, p < 0.01 \) (see Table 1). Thus, although the objective particulate matter ratings lack the richness of individuals’ idiosyncratic appraisals as captured by our diary data, there is convergent validity for our four-item measure of air pollution appraisals when compared against an objective air pollution indicator.

3.3.2. Self-control resource depletion

Employee self-control resource depletion was measured with a five-item scalar previously used in the self-control literature (Lanaj, Johnson, & Barnes, 2014; Yam, Chen, & Reynolds, 2014). The items included “Today, I felt like my willpower was gone,” “Today, I felt drained,” “Today, my mind felt unfocused,” “Today, it would have taken a lot of effort for me to concentrate on something,” and “Today, I couldn’t absorb any information” (1 = Strongly Disagree; 7 = Strongly Agree; \( \alpha = 0.96 \)).

3.3.3. Organizational citizenship and counterproductive work behavior

Employee organizational citizenship behavior was measured with five items from Lee and Allen (2002), which has been previously utilized in Chinese contexts (Wu, Huang, & Chan, 2012; Xu, Huang, Lam, & Miao, 2012). Participants indicated the extent to which they “Expressed loyalty toward the organization,” “Took action to protect the organization from potential problems,” “Demonstrated concern about the image of the organization,” “Willingly gave my time to help others who had work-related problems,” and “Showed genuine concern and courtesy toward my coworkers.” These items were selected by the research team from Lee and Allen’s (2002) full 16 item scale based on three criteria: (a) their likelihood of varying on a daily basis, (b) their potential relevance to participants’ organizations and occupations, and (c) their ability to capture both the interpersonal and organizational components of OCB (1 = Strongly Disagree; 7 = Strongly Agree; \( \alpha = 0.92 \)).

Employee counterproductive work behavior was measured with five items from Bennett and Robinson (2000). Participants indicated the extent to which they “Worked on a personal matter instead of work for my employer,” “Spent too much time fantasizing or daydreaming instead of working,” “Made fun of someone at work,” “Took an additional or a longer break than is acceptable at my workplace,” and “Lost my temper while at work” during the day. As with the OCB items, these items were selected from Bennett and Robinson’s (2000) full 13 item scale based on (a) their likelihood of varying on a daily basis, (b) their potential relevance to participants’ organizations and occupations, and (c) their ability to capture both the interpersonal and organizational components of CWB (1 = Strongly Disagree; 7 = Strongly Agree; \( \alpha = 0.81 \); see Bowling, Wang, Tang, & Kennedy, 2010; Yam, Klotz, He, & Reynolds, 2016 for previous examples in Chinese contexts).

3.3.4. Trait self-control

Participants completed a 13-item trait self-control measure as part of the entry survey, one week prior to the daily diary component of the study (Tangney et al., 2004). Sample items included “I am good at resisting temptation,” “I refuse things that are bad for me,” and “People would say that I have iron self-discipline” (1 = Strongly Disagree; 5 = Strongly Agree; \( \alpha = 0.78 \)).
Table 1
Descriptive statistics and bivariate correlations.

<table>
<thead>
<tr>
<th>Daily variables</th>
<th>Mean</th>
<th>SD</th>
<th>Within-individual</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution appraisals</td>
<td>4.06</td>
<td>1.79</td>
<td>1.27</td>
<td>(0.98)</td>
<td>0.22</td>
<td>-0.09</td>
<td>0.08</td>
<td>0.26</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-control resource depletion</td>
<td>2.69</td>
<td>1.30</td>
<td>1.04</td>
<td>0.29</td>
<td>(0.96)</td>
<td>-0.29</td>
<td>0.43</td>
<td>0.61</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OCB</td>
<td>4.67</td>
<td>1.06</td>
<td>0.89</td>
<td>-0.11</td>
<td>-0.37</td>
<td>(0.92)</td>
<td>-0.25</td>
<td>-0.19</td>
<td>0.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CWB</td>
<td>2.76</td>
<td>0.99</td>
<td>0.79</td>
<td>0.11</td>
<td>0.58</td>
<td>-0.37</td>
<td>(0.81)</td>
<td>0.36</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative affect</td>
<td>2.07</td>
<td>1.04</td>
<td>0.88</td>
<td>0.34</td>
<td>0.74</td>
<td>-0.23</td>
<td>0.48</td>
<td>(0.95)</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective air pollution level</td>
<td>91.44</td>
<td>46.95</td>
<td>16.48</td>
<td>0.28</td>
<td>0.14</td>
<td>-0.02</td>
<td>0.05</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Individual variables | Mean | SD | Within-individual | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----------------------|------|----|-------------------|---|---|---|---|---|---|---|---|
| Age | 32.80 | – | 6.80 | -0.08 | -0.26 | 0.06 | -0.13 | -0.13 | -0.12 | | |
| Gender | 1.48 | – | 0.50 | 0.07 | 0.06 | -0.08 | 0.01 | 0.01 | -0.01 | -0.13 | | |
| Trait self-control | 3.39 | – | 0.48 | -0.07 | -0.41 | 0.28 | -0.41 | -0.26 | -0.06 | 0.30 | 0.08 | (0.78) |

Note: Variables 1–6 are within-individual (Level 1). Variables 7–9 are between-individual (Level 2). Within-individual correlations are shown above the diagonal, with within-individual variables aggregated to the between-individual level (n = 155).
At the between-individual level, all rs > 0.20 are significant, p < 0.01.

4. Control variables

4.1. Negative affect

Given the undesirable nature of air pollution, it is reasonable to suggest that air pollution appraisals will influence individuals’ negative affect. However, consistent with ego depletion theory, we argued that self-control resource depletion will uniquely mediate the effects of air pollution appraisals on employees’ OCBs and CWBs (Hagger et al., 2010). To strengthen our arguments, we therefore included daily negative affect as a control variable at the day level. Specifically, we utilized the eight-item negative affect scale from the PANAS (Watson, Clark, & Tellegen, 1988; α = 0.95).

4.2. Objective air pollution

To demonstrate the unique importance of employees’ air pollution appraisals, we controlled for objective air pollution levels at the daily level.

4.3. Demographic variables

Past research suggests that age and gender are two important demographic attributes that may affect OCBs and CWBs (Berry, Ones, & Sackett, 2007; Dalal, 2005). In addition, age and gender may affect the appraisals of air pollution. For example, older employees might be more used to observing air pollution and hence less sensitive to its harmful effects. Thus, we added them as Level-2 controls.

4.4. Organization effects

Because employees were selected from nine different organizations, we constructed a three-level HLM model (i.e. HLM3) to account for the nested structure of our data (Raudenbush & Bryk, 2002).

4. Results

4.1. Validation of OCB and CWB scales

In this study, we utilized OCB and CWB items primarily used in Western samples and, due to our daily diary design, employed shortened versions of the original scales. Therefore, we conducted two validation studies through Sojump, an online survey administration platform in China. First, we asked 129 full-time employees in China (M_age = 30.68; 52% male) to indicate the perceived ethicality of each item in our shortened OCB and CWB scales and the full scales from which they were derived (1 = Very Unethical; 4 = Neither Ethical Nor Unethical; 7 = Very Ethical). On average, participants perceived the OCB items for the full and short scales to be ethical, indicated by one-sample t-tests comparing participants’ responses to the scale midpoint (full scale: M = 5.37; SD = 0.71; t(128) = 21.99, p < 0.001; short scale: M = 5.47; SD = 0.85; t(128) = 19.71, p < 0.001). Conversely, participants perceived the CWB items for the full and short scales to be unethical (full scale: M = 2.08; SD = 0.83; t(128) = -26.37, p < 0.001; short scale: M = 2.69; SD = 0.91; t(128) = -16.34, p < 0.001).

Second, we asked a separate sample of 127 full-time employees in China (M_age = 33.10; 55.1% male) to complete our shortened OCB and CWB scales as well as Farh, Earley, and Lin’s (1997) OCB scale and Peng’s (2012) CWB scale, both of which were developed in the Chinese context. The two OCB scales were correlated r(127) = 0.63, p < 0.001, and the two CWB scales were correlated r(127) = 0.77, p < 0.001. These strong correlations suggest significant conceptual overlap across scales, indicating that our shortened OCB and CWB scales were able to capture the intended constructs in Chinese samples.

4.2. Analytic approach for primary data

Given the multilevel nature of our data (i.e., days nested within participants nested within organizations), we utilized three-level hierarchical linear modeling (HLM3) to test our hypotheses (Raudenbush & Bryk, 2002). The data were separated across three levels: the within-individual level (Level 1), the between-individual level (Level 2), and the organizational level (Level 3). Employees’ daily air pollution appraisals, self-control resource depletion, OCBs, CWBs, negative affect, and objective air pollution were entered at Level 1. Employees’ trait self-control, age, and gender were entered at Level 2. In addition, following previous diary studies (Lanaj et al., 2014; Wang et al., 2013) and recommendations for analyzing diary data (Bolger, Davis, & Rafaeli, 2003; Ohly, Sonnentag, Niessen, & Zapf, 2010), we controlled for participants’ previous-day self-control resource depletion, OCBs, and CWBs in all of our analyses.1 All Level 1 predictors were centered at individuals’ means (i.e. group mean centered) according to the recommendations of Hoffman, Griffin, and Gavin (2000). This form of centering removes all between-individual variance from the predictors. As a result, all individual differences that could potentially affect responses are effectively controlled, allowing for a better understanding of within-individual relationships (Raudenbush & Bryk, 2002).

1 To ensure that our findings were not unduly affected by the inclusion of these control variables, we also reanalyzed our data without the inclusion of control variables. The pattern of findings remained consistent regardless of whether the controls were included in our models. Details regarding these supplementary analyses are available from the first author upon request.
Bryk, 2002). To facilitate interpretation, we standardized all predictor variables, except for gender (a dummy variable), before entering them into the regression models to obtain standardized regression coefficients.

Mediation at the within-individual level and the cross-level moderated mediation effects were tested via a Monte Carlo simulation procedure using the open source software R (available at http://www.quantpsy.org). This technique is recommended for the testing of indirect effects in multilevel models because the indirect effect in a multilevel model is typically not normally distributed, violating the statistical principles of some traditional methods (e.g., the Sobel test) for testing a mediated effect. Applying this procedure can yield asymmetric confidence intervals (CIs) around the observed indirect effect by generating random draws from the parameter distributions. The computed asymmetric CIs are thus applicable to the skewed sampling distributions of indirect effects (Preacher, Zyphur, & Zhang, 2010). The Level 2 moderator of trait self-control was grand-mean centered prior to all cross-level hypothesis testing.

4.3. Preliminary analyses

4.3.1. Descriptive statistics and correlations

Means, standard deviations, and correlations are presented in Table 1. Within-individual correlations are presented above the diagonal, and between-individual correlations are presented below the diagonal. At the between-individual level, within-individual constructs are aggregated to the individual’s average score over the ten day reporting period.

4.3.2. Factor analysis

A multilevel confirmatory factor analysis (MCFA) was conducted to confirm the hypothesized six-factor structure of the air pollution appraisal, trait self-control, depletion, OCB, CWB, and negative affect scales while accounting for the nested structure of the data (Muthen, 1994). We specifically employed a parceling technique, creating parcels for trait self-control and negative affect, which had more than five measurement items. We opted to use a parceling approach due to our primary interest in the interrelations of our constructs, rather than the interrelations of our items within constructs. (Little, Rhemtulla, Gibson, & Schoemann, 2013). Specifically, two- and three-item parcels were created using an item-to-construct balance technique, where the highest loading items were paired with the lowest loading items to create parcels (Little, Cunningham, Shahar, & Widaman, 2002; Sass & Smith, 2006). This resulted in two three-item parcels and two two-item parcels for our trait self-control measure, four two-item parcels for our negative affect measure, two two-item parcels for our air pollution appraisals measure, and one two-item parcel and one three-item parcel of each of our other three scales (self-control resource depletion, OCBs, and CWBs). Model fit was evaluated based on the root mean square error of approximation (RMSEA), standardized root-mean-square-residual (SRMR), and the comparative fit index (CFI). Commonly accepted cutoff values were employed (Marsh, Hau, & Wen, 2004; CFI > 0.90; RMSEA < 0.10).

The hypothesized six-factor model demonstrated good fit to the data: $\chi^2 = 144.78$, df = 44, $p < 0.05$, CFI = 0.98, RMSEA = 0.04; SRMR (within) = 0.03, SRMR (between) = 0.00. This five-factor model fit the data better than a four-factor model grouping depletion and negative affect: $\chi^2 = 694.65$, df = 48, $p < 0.05$, CFI = 0.88, RMSEA = 0.09; SRMR (within) = 0.08, SRMR (between) = 0.00; $\Delta \chi^2 = 479.52$, $\Delta$df = 4, $p < 0.01$, and another four-factor model grouping OCB and CWB: $\chi^2 = 527.75$, df = 48, $p < 0.05$, CFI = 0.91, RMSEA = 0.08; SRMR (within) = 0.13, SRMR (between) = 0.00; $\Delta \chi^2 = 329.48$, $\Delta$df = 4, $p < 0.01$. Overall, the results of the MCFA support the discriminant validity among our daily focal constructs.

4.3.3. Variance partitioning

Prior to testing our hypotheses, we conducted a variance partitioning test to confirm the hypothesized six-factor structure of the air pollution appraisals, 39% of variation in self-control depletion, 33% of variation in OCBs, and 41% of variation in CWBs. Level 2 (across individuals) accounted for 40% of variation in air pollution appraisals ($\chi^2 [146] = 1153.73$, $p < 0.001$), 57% of variation in self-control depletion ($\chi^2 [146] = 2253.62$, $p < 0.001$), 63% of variation in OCBs ($\chi^2 [146] = 2941.99$, $p < 0.001$), and 53% of variation in CWBs ($\chi^2 [146] = 2017.19$, $p < 0.001$). Level 3 (across organizations) accounted for 4% of variation in air pollution appraisals ($\chi^2 [8] = 24.18$, $p < 0.01$), 4% of variation in self-control depletion ($\chi^2 [8] = 16.70$, $p < 0.05$), 4% of variation in OCBs ($\chi^2 [8] = 18.65$, $p < 0.05$), and 6% of variation in CWBs ($\chi^2 [8] = 29.72$, $p < 0.001$).

4.4. Hypothesis testing

4.4.1. Within-individual hypotheses

Hypothesis 1 predicted that participants’ air pollution appraisals would be positively associated with self-control resource depletion. We tested this hypothesis by regressing daily self-control resource depletion on daily air pollution appraisals, controlling for the previous day’s self-control resource depletion, objective air pollution, demographics, and the individual-level moderator (i.e., trait self-control). Thus, the regression coefficient reflects the day-level change in self-control depletion associated with employees’ appraisals of the day’s air pollution. As summarized in Model 2 of Table 3, air pollution severity was positively related to self-control resource depletion ($\gamma = 0.13$, $p < 0.01$). Therefore, Hypothesis 1 was supported.

Hypothesis 2 predicted that air pollution appraisals would exhibit an indirect effect on OCBs via self-control resource depletion. Following Bauer, Preacher, and Gil’s (2006) suggestion, we estimated the indirect effect via a Monte Carlo simulation with 20,000 replications to obtain a confidence interval around the indirect effect of air pollution appraisals on OCB via resource depletion (see also Selig & Preacher, 2008). The results indicated a significant indirect effect, whereby the bias corrected 95% confidence interval did not include zero (indirect effect = –0.013, CI [–0.026, –0.002]). Thus, Hypothesis 2 was supported. Hypothesis 3 predicted that air pollution appraisals would exhibit an indirect effect on CWBs via self-control resource depletion. Monte Carlo simulation results suggested that the estimate for the indirect effect of air pollution severity on CWB was significant, with a bias corrected 95% confidence interval did not include zero (indirect effect = 0.012, CI [0.001, 0.025]). These results provided support for Hypothesis 3 (see Table 4).

4.4.2. Cross-level hypotheses

Hypothesis 4a predicted that trait self-control would moderate the mediated effect of air pollution appraisals on employee OCB (i.e., first-stage moderated mediation). Following past research (Preacher, Rucker, & Hayes, 2007; Zhang, Waldman, & Wang, 2012) we examined this cross-level effect in two steps. First, we tested the effect of the cross-level interaction between employee trait self-control and pollution appraisals on employee self-control resource depletion. Specifically, we computed the simple slopes for air pollution appraisals in predicting daily self-control

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2 Because we used multilevel modeling, the Satorra-Bentler scaled chi-square difference tests were applied in model comparisons (https://www.statmodel.com/chidiff.shtml). We thank an anonymous reviewer for this suggestion.
resource depletion when trait self-control was high versus low (i.e. ±1 SD; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Results of this slopes-as-outcomes model revealed that trait self-control was a significant moderator of the within-individual relationship between air pollution appraisals and self-control resource depletion \( (\beta = -0.12, p < 0.001; \text{Model 3 in Table 3}) \). Simple slopes

### Table 2
Parameter estimates and variance composition of Level 1 variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intercept ( b_{00} )</th>
<th>Within-individual variance ( (e^2) )</th>
<th>Between-individual variance ( (r^2) )</th>
<th>Between-firm variance ( (u^2) )</th>
<th>Percentage of within-individual variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution appraisals</td>
<td>4.06 ( ^* )</td>
<td>1.80 ( ^* )</td>
<td>1.28 ( ^* )</td>
<td>0.16 ( ^* )</td>
<td>56 ( % )</td>
</tr>
<tr>
<td>Self-control resource depletion</td>
<td>2.72 ( ^** )</td>
<td>0.66 ( ^\star )</td>
<td>0.96 ( ^\star )</td>
<td>0.06 ( ^\star )</td>
<td>39 ( % )</td>
</tr>
<tr>
<td>Organizational citizenship behavior</td>
<td>4.63 ( ^* )</td>
<td>0.37 ( ^* )</td>
<td>0.71 ( ^* )</td>
<td>0.04 ( ^* )</td>
<td>33 ( % )</td>
</tr>
<tr>
<td>Counterproductive work behavior</td>
<td>2.82 ( ^* )</td>
<td>0.40 ( ^* )</td>
<td>0.51 ( ^* )</td>
<td>0.06 ( ^* )</td>
<td>41 ( % )</td>
</tr>
</tbody>
</table>

Note: \( b_{00} \) represents the average level of the variable across individuals. \( e^2 \) represents the within-individual variance, \( r^2 \) the between-individual variance in the variable, and \( u^2 \) the between-firm variance in the variable. Percentage of within-individual variance was computed as the \( e^2/(e^2 + r^2 + u^2) \).

\* \( p < 0.05. \)

\** \( p < 0.01. \)

\*** \( p < 0.001. \)

### Table 3
HLM3 results on self-control depletion, organizational citizenship behavior, and counterproductive work behavior.

<table>
<thead>
<tr>
<th></th>
<th>Self-control depletion ( (t) )</th>
<th>OCB ( (t) )</th>
<th>CWB ( (t) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
</tr>
<tr>
<td>Intercept</td>
<td>2.529 ***</td>
<td>2.524 ***</td>
<td>2.523 ***</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.170)</td>
<td>(0.173)</td>
<td>(0.249)</td>
</tr>
<tr>
<td>Level-1 variables</td>
<td>Objective air pollution level</td>
<td>-0.006</td>
<td>-0.035</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.017)</td>
<td>(0.024)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>Negative affect ( (t) )</td>
<td>0.418 ***</td>
<td>0.341 ***</td>
<td>0.335 ***</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.045)</td>
<td>(0.045)</td>
<td>(0.066)</td>
</tr>
<tr>
<td>Self-control depletion ( (t - 1) )</td>
<td>0.060</td>
<td>0.029</td>
<td>0.032</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.028)</td>
<td>(0.024)</td>
<td>(0.046)</td>
</tr>
<tr>
<td>OCB ( (t - 1) )</td>
<td>0.129 ***</td>
<td>0.135 ***</td>
<td>-0.051</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.036)</td>
<td>(0.036)</td>
<td>(0.031)</td>
</tr>
<tr>
<td>Self-control depletion</td>
<td>-0.097</td>
<td>0.090</td>
<td></td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.038)</td>
<td>(0.038)</td>
<td></td>
</tr>
<tr>
<td>Level-2 variables</td>
<td>Age</td>
<td>-0.154 ( ^* )</td>
<td>-0.158 ( ^* )</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.076)</td>
<td>(0.074)</td>
<td>(0.082)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.113</td>
<td>0.117</td>
<td>0.118</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.091)</td>
<td>(0.095)</td>
<td>(0.159)</td>
</tr>
<tr>
<td>Trait self-control</td>
<td>-0.388 ***</td>
<td>-0.385 ***</td>
<td>-0.391 ***</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.048)</td>
<td>(0.051)</td>
<td>(0.081)</td>
</tr>
<tr>
<td>Cross-level interactions</td>
<td>Air pollution appraisals \times trait self-control</td>
<td>-0.122 ***</td>
<td>(0.032)</td>
</tr>
<tr>
<td>( \text{SE} )</td>
<td>(0.045)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( e^2 )</td>
<td>0.465</td>
<td>0.434</td>
<td>0.435</td>
</tr>
<tr>
<td>( r^2 )</td>
<td>0.871 ***</td>
<td>0.874 ***</td>
<td>0.874 ***</td>
</tr>
<tr>
<td>( u^2 )</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: \( e^2 \) represents the within-individual variance, \( r^2 \) the between-individual variance in the variable, and \( u^2 \) the between-firm variance in the variable.

\* \( p < 0.05. \)

\** \( p < 0.01. \)

\*** \( p < 0.001. \)

### Table 4
Conditional indirect effects of air pollution appraisals via self-control resource depletion on OCB and CWB at low and high levels of trait self-control.

<table>
<thead>
<tr>
<th></th>
<th>OCB</th>
<th>CWB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indirect effect</td>
<td>95% CI</td>
</tr>
<tr>
<td>Overall</td>
<td>-0.013</td>
<td>[-0.026, -0.002]</td>
</tr>
<tr>
<td>High trait self-control</td>
<td>-0.001</td>
<td>[-0.012, 0.009]</td>
</tr>
<tr>
<td>Low trait self-control</td>
<td>-0.025</td>
<td>[-0.048, -0.006]</td>
</tr>
<tr>
<td>Difference</td>
<td>0.024</td>
<td>[0.005, 0.049]</td>
</tr>
</tbody>
</table>

Note: All conditional indirect effect analyses are controlling for employee age, employee gender, negative affect, and daily objective air pollution.
analyses indicated that the positive relationship between air pollution appraisals and self-control resource depletion was significantly weaker among individuals with high trait self-control ($\gamma = 0.01, z = 0.51, p > 0.05$) than among those with low trait self-control ($\gamma = 0.26, z = 8.48, p < 0.001$; see Fig. 2).

Second, we multiplied the coefficients for these simple slopes by the coefficients for the path between self-control resource depletion and OCB (from Model 5 of Table 3) to obtain estimates for the indirect effects. As previously mentioned, a Monte Carlo method was applied to obtain the bias corrected 95% confidence intervals for these conditional indirect effects and ascertain the difference between them (MacKinnon, Fairchild, & Fritz, 2007). Results suggested that the indirect effect of air pollution appraisals on OCB was not significant among individuals with high trait self-control (Indirect effect = $-0.001$; 95% CI = $[-0.012, 0.009]$), but was significant among individuals with low trait self-control (Indirect effect = $-0.025$; 95% CI = $[-0.048, -0.006]$). Moreover, the difference between these two indirect effects was significant ($\Delta$ Indirect effect = 0.024; 95% CI = $[0.005, 0.049]$), thereby demonstrating support for Hypothesis 4a.

Hypothesis 4b predicted that trait self-control would moderate the mediated effect of perceived pollution severity on employee counterproductive work behavior. Following the same procedures as explained above, we multiplied the coefficients for the simple slopes of the path between self-control resource depletion and CWBs (from Model 7 of Table 3) to obtain estimates for the conditional indirect effects. Monte Carlo analyses revealed that the indirect effect was not significant (Indirect effect = 0.001; 95% CI = $[-0.008, 0.012]$) among individuals with high trait self-control, but was significant among individuals with low trait self-control (Indirect effect = 0.023; 95% CI = $[0.003, 0.047]$). Moreover, the difference between these two indirect effects was significant ($\Delta$ Indirect effect = $-0.022$; 95% CI = $[-0.047, -0.002]$), thereby demonstrating support for Hypothesis 4b.

5. Discussion

Throughout the world, air pollution is reaching hazardous levels with growing frequency (Akimoto, 2003; Dockery & Pope, 1994). The problem is particularly acute in China, where trends in urbanization, industrialization, and other forces have caused it to accelerate (Kahn & Yardley, 2007; Tatlow, 2014). Whereas health experts have increasingly recognized the importance of addressing air pollution’s effects, research on the psychology of air pollution is underdeveloped. Furthermore, organizational scholars have overlooked air pollution’s impact on workplace outcomes. The current research thus represents an important step in examining the psychological experience of air pollution appraisals and its impact on employees’ daily behavior. Diary data from 155 employees working in a major city in Central China demonstrated that daily fluctuations in air pollution appraisals have direct implications for employees’ daily self-control resource depletion and, in turn, influence their daily OCBs and CWBs. In further support of the self-control perspective, we found that these effects are strongest among employees with low trait self-control, and hold even after controlling for employees’ daily negative affectivity and objective air pollution levels.

Although the effects in our study are somewhat small, it is important to note that the aggregate implications are still quite significant. As of 2015, well over half of China’s population is estimated to reside in urban areas. In total, 393 million people are estimated to be working in these cities (China Statistical Yearbook, 2015). Thus, even if employees engaged in an average of one OCB and one CWB per day, and even if a significant reduction in employees’ air pollution appraisals only impacted one out of every 1000 OCBs and CWBs on a given day, the aggregate result would still be an increase in hundreds of thousands of OCBs, and a decrease in hundreds of thousands of CWBs across the country every day, suggesting significant economic implications at the national level. In the sections below we highlight the key theoretical contributions and practical implications of our findings. Then, we consider the limitations of our study and important directions for future research.

5.1. Theoretical contributions

Rapid population growth and urbanization have fundamentally shifted Chinese citizens’ daily lives in many ways. One of the principle effects of these trends has been a dramatic shift in the quality of the air that urban citizens breathe on a daily basis. Indeed, the majority of employees in our sample (83%) agreed that the air pollution was severe during at least one day of our study, highlighting air pollution’s role in daily life. Thus, our first contribution is to take a first step in understanding the changing natural environment’s psychological and behavioral effects on workers in China.

Second, we contribute to the literature on employee self-control by identifying air pollution appraisals as an important predictor of employees’ daily self-control resource depletion. A growing body of research demonstrates that self-control resources are an important component of employees’ everyday experiences (Quinn, Spritzer, & Lam, 2012). When their self-control resources are diminished, employees experience a host of negative outcomes (Hagger et al., 2010). Although interest in the organizational implications of self-control is growing, research to date has focused on a somewhat narrow range of predictors, typically centered around employees’ job demands (e.g., Trougakos et al., 2015). Some scholars have theorized that a broader range of phenomena are likely to cause employees to feel depleted (Hobfoll, 2001), but links between self-control and broader contextual components of employees’ lives have received limited empirical attention. Thus, the second contribution of this study is to identify air pollution appraisals as an important yet overlooked source of employee depletion, driven by an interrelated set of psychological factors.

Our third contribution is to the literatures on OCBs and CWBs. Employees’ OCBs and CWBs have a dramatic impact on organizations over time. For instance, surveys have suggested that CWBs cost organizations billions of dollars annually in the United States alone (Bennett & Robinson, 2000). Given the ubiquity of air pollution in China, even a small link between air pollution and employees’ OCBs and CWBs stands to have a dramatic aggregate effect (Prentice & Miller, 1992). Despite an extensive literature on the predictors of OCBs and CWBs, the self-control perspective has only
gathered attention in recent years. For example, Christian and Ellis (2011) have linked sleep deprivation to increases in deviance as a result of self-control depletion. Among this handful of studies, even fewer have simultaneously integrated the depletion literature with the literatures on employee citizenship and counterproductive behavior. Thus, we contribute to this literature by highlighting air pollution appraisal as an important factor that influences both OCBs and CWBs by impinging on employees’ self-control resources. Equally important, we contribute to this literature by focusing on within-individual variance, thus capturing a dimension of variation in depletion, OCB, and CWB typically overlooked in between-individual research (Cortina & Landis, 2009).

Finally, we contribute to the management literature by answering calls for a more global approach to management research (Tsui, 2007) and greater attention to the unique challenges of rapid industrialization and urbanization in China and other developing countries (Gelfand et al., 2011). Past global management research has tended to focus on the role of employee values, such as collectivism and power distance, on employee outcomes (Tsui, Nifadkar, & Ou, 2007). Although research on employees’ values in global contexts is important, we suggest that a global approach to management research also requires close examinations of the effects of industrialization and urbanization. For example, the Chinese labor force has transformed dramatically in the 21st century, moving many employees from lives as farmers to lives as factory workers and residents of dense urban environments. Such environments are fraught with an array of new opportunities and challenges. Amidst this change, the question of how employees’ daily lives are affected is an important one. In this paper, we show that employees in China’s urban environments face unique challenges with psychological and behavioral implications that must be explicitly addressed.

5.2. Practical implications

The effects of air pollution appraisals on employees’ self-control resources, OCBs, and CWBs suggest several important practical implications. To date, policy analysts have emphasized the toll that air pollution exacts through its health effects. Our research suggests that this approach underestimates air pollution’s impact. Beyond the physiological, air pollution appraisals directly impact employees’ behaviors at work as well. At the organizational level, our findings suggest that organizations must do what they can to support employees with persistently negative air pollution appraisals. For example, organizations can allow their employees to telecommute on days when the air pollution is particularly worrisome, provide employees with regular health screenings to reduce the anxiety associated with air pollution’s psychological effects, and offer workshops on coping with stress more generally. At the individual level, our research suggests that employees can also seek to proactively manage their air pollution appraisals by building support systems, shortening commute times, and maintaining their physical health.

An additional issue of significant practical importance is the disconnect between the effects of air pollution appraisals (i.e., increased self-interested behavior) and the sorts of collective action needed to resolve the problem of air pollution more broadly (e.g., a collective resolve to switch to alternative sources of energy). In considering the practical implications of this paradox, we suggest that value activation might play a significant role (Verplanken & Holland, 2002). Specifically, we suggest that interventions might mitigate the self-interested effects of air pollution appraisals by highlighting the importance of prosocial values and collective action, thus facilitating support for society-level regulatory and behavioral shifts toward the common good.

5.3. Future directions and limitations

Despite a number of contributions, our paper is not without its limitations, highlighting important directions for future research.

First, several key limitations of our methodological approach should be highlighted. In our research, we relied on employees’ assessments of their own depletion, OCBs, and CWBs. Although we mitigated single source bias concerns by controlling for individuals’ negative affect as a directly measured latent methods factor and employees’ levels of depletion, OCBs, and CWBs on the previous day, potential concerns remain. For example, participants might have been unduly affected by pollution levels at the end of the day when they reported their experiences (Redelmeier, Katz, & Kahneman, 2003). Future research can utilize complementary methods to improve our understanding of air pollution appraisals’ effects by including measures of social desirability, collecting multisource data, and collecting data at multiple points in time throughout the day (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Similarly, we encourage future research to employ indigenous measures of OCBs and CWBs developed in China (Farh et al., 1997), and in-depth scales with the potential to more fully capture the construct spaces and factor structures of our focal variables.

Second, although we examined trait self-control as a moderator of the effects of air pollution appraisals on individuals’ daily depletion levels, we did not examine second-stage moderators of depletion’s effects. In other words, we did not directly consider factors that might attenuate the effects of employee depletion on OCBs and CWBs. Given the prevalence of depletion in modern, high-workload organizations, the benefits of such examinations are extensive. Thus, we encourage future work on air pollution appraisals and other depleting forces to carefully consider how organizations might attenuate depletion’s effects, especially within the context of Chinese organizations.

Third, our research was limited to Wuhan, a densely populated and highly polluted city in the central Hubei province. Research by Wei, Zhu, Marinova, and Wang (2015) suggests that individuals’ air pollution appraisals depend in part on where they live. More specifically, Wei et al. (2015) found that individuals are most sensitive to air pollution when they live in a city that is not typically polluted. In other words, their paper suggests that individuals might become psychologically desensitized to air pollution over time. This finding highlights the importance of examining air pollution appraisals in other cities and, more generally, considering how situational forces impact these appraisals. For example, individuals’ air pollution appraisals might increase with media exposure or highly salient events, such as the grounding of airplanes when the pollution makes it too difficult for planes to navigate.

Fourth, it is important to note that air pollution is only one component of the natural environment in China. Industrialization and urbanization are likely to have a range of additional, related implications for employees’ daily lives. For example, beyond air pollution, Chinese citizens often suffer from a lack of potable water and healthy food. In emphasizing the role of context on organizations in China, we emphasize that culture is not simply a product of values systems. More practical realities, such as air pollution, food availability, political climate, and government regulations all play vital roles in influencing employees’ daily realities (Gelfand et al., 2011). Air pollution appraisals might similarly be expected to exert a range of effects beyond employees’ OCBs and CWBs. The burnout literature, for example, suggests that air pollution is likely to negatively influence employees’ job satisfaction, commitment to the organization, turnover, and job performance. These possibilities speak to the many other potential negative effects of air pollution not examined in this research. Conversely, air pollution might encourage employees to voice their environmental con-
cerns and enhance their organizations’ focus on sustainability. We urge future research to continue examining the changing natural environment and its full range of effects on employees and organizations.

Finally, we note the value of applying the lessons from this research in China to other nations throughout the world. Indeed, air pollution levels in countries such as India, Bangladesh, and Nigeria frequently exceed levels in China (Parke, 2016). Furthermore, it is reasonable to presume that air pollution will become more of a concern in other countries and cities throughout the world as the effects of industrialization and urbanization continue to spread. Thus, we encourage future research to explore the similarities and differences in employees’ air pollution experiences across nations, and thus deepen scholars’ understanding of the link between organizations and the natural environment around the world.

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References


