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Article

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Spillover of Social Norms at Work On Employees' Self-Reported Private Sphere Pro-Environmental Behaviour: A Mixed Method Investigation

Hans Jaich  · Sarah Margaretha Jastram · Knut Blind

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Abstract This article draws on the Focus Theory of Normative Conduct to examine whether injunctive social norms relating to perceived environmental management practices shape employees' self-reported pro-environmental behaviour in their private sphere. To test our hypotheses, we employed a mixed methods research approach that involved a cross-sectional analysis and a pretest-posttest quasi-experimental field study in the German tourist industry. Our results verify the context-bridging influence of perceived environmental management practices on employees' self-reported private sphere pro-environmental behaviour. Further, they reveal that this relationship is partially mediated by descriptive social norms among co-workers. Thereby, our findings shed light on a thus far neglected dynamic between injunctive and descriptive social norms that constitutes a pathway for contextual spillover. Our study thus challenges the prominent proposition that the influence of injunctive social norms remains restricted to contexts in which the norm is currently salient. The results further develop existing theory by demonstrating how a dynamic interaction between injunctive and descriptive norms can support the emergence and dissemination of social norms across contexts and they reveal how businesses can shape this process.

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JEL-Classification M0

1 Introduction

Management scholars increasingly stress the need to investigate how organizations can help address grand challenges such as environmental degeneration and climate change (Stephan et al. 2016; Schaltegger et al. 2020; Wickert et al. 2021; Gümüşay et al. 2022; Jastram et al. 2022; Voegtlin et al. 2022). The view that these challenges require significant change in consumption and lifestyle patterns is gaining support in various research fields (Dauvergne 2010; Nyborg et al. 2016; Kallis et al. 2018; Díaz et al. 2019; Otto et al. 2020). In this context, scholars highlight the pivotal role of social norms in guiding behaviour by reinforcing shared understandings of what is acceptable and what is not (Ostrom 2000; Nyborg et al. 2016; Farrow et al. 2017). Accordingly, social norms have been identified as a critical factor in determining individuals' pro-environmental behaviour (PEB), which refers to behaviour that harms the environment as little as possible and/or intentionally benefits the environment (Steg and Vlek 2009). However, despite extensive research on social norm compliance, "relatively little is known about how norms develop, are learned, and change over time" (Van Kleef et al. 2019, p. 4). In addition, the role of businesses as contexts in which social norms are frequently experienced and potentially internalized has received surprisingly little attention in the existing literature (Blay et al. 2018). These shortcomings hamper our ability to develop a comprehensive understanding of the dissemination of social norms and of how organizations shape this process. Against this background, our research aims to examine whether businesses are able to drive social change across institutional boundaries. Specifically, we are interested in examining whether corporate environmental management practices can translate into private sphere PEB of employees via the influence of social norms.

For this purpose, this study draws on the Focus Theory of Normative Conduct (FTNC) (Cialdini et al. 1990) which has been widely applied to examine social norms and PEB (Kallgren et al. 2000; Schultz et al. 2008; Hamann et al. 2015; Stok and de Ridder 2019). The FTNC distinguishes between two types of social norms: injunctive social norms, referring to perceptions of what others approve or disapprove of, and descriptive social norms, relating to perceptions of the actual behaviour of others (Cialdini et al. 1990; Kallgren et al. 2000). Norton et al. (2014) identified corporate environmental management practices (EMP), defined as all managerial measures aiming to reduce the ecological impact of an organization (Cramer 1998), as injunctive social norms which imply that the organization approves environmental protection. Several studies have verified that injunctive social norms are associated with individuals' PEB (Cialdini et al. 1990; Norton et al. 2014; Farrow et al. 2017). Moreover, organizational scholars have revealed that organizational engagement in environmental protection positively affects employees' PEB at work (Rasmus and

Steger 2000; Paillé and Raineri 2015; Raineri and Paillé 2016; Fanghella et al. 2022). This, in turn, can increase pro-environmental descriptive social norms at work, since PEB becomes more observable among co-workers.

However, according to Norton et al. (2015), it remains unclear whether employees internalize pro-environmental social norms at work or merely follow company expectations. In fact, it has been widely shared in the literature that the influence of injunctive social norms remains essentially restricted to contexts in which the norm is currently salient (Miller et al. 1999; Kallgren et al. 2000; Schultz et al. 2008; Jacobson et al. 2011). Yet, we argue that a thus far neglected interaction between injunctive and descriptive social norms may support their internalization. We assume that if social norms become internalized as intrinsic motivations, they could provide a basis for contextual spillover (Nash et al. 2017), referring to the effects of one context on the subsequent behaviour in other, independent contexts (Nilsson et al. 2017). Following previous investigations on PEP we use employee self-reports as an indicator of individual behaviour (Kormos and Gifford 2014) and hypothesize that perceived EMP may have a positive effect on employees' private sphere PEB. Furthermore, we argue that this phenomenon could be supported through the interaction of injunctive and descriptive social norms.

Based on these considerations, our core research questions are whether injunctive social norms related to perceived EMP positively affect employees' self-reported private sphere PEB and whether this relationship is mediated by descriptive social norms among co-workers. In order to examine these questions, we utilized a mixed methods approach (Mitchell and Ambrose 2012; Thau et al. 2015; Oreg and Berson 2015; Lude and Prügl 2018, 2019) employing a cross-sectional analysis ($N=206$) and a quasi-experimental field study ($N=61$). Our methodology meets recent calls for experimental designs in research on corporate sustainability (Barnett et al. 2020), contextual spillover (Xu et al. 2020), and organizational behaviour (Eden 2017). The majority of studies in these research fields build on correlational data and therefore lack causal persuasiveness. Against this background, organizational scholars have advocated for quasi-experimental field studies (Grant and Wall 2009), because they allow the detection of plausible causality while preserving internal and external validity without interrupting the real-world experimental setting through artificial interventions (Cook and Campbell 1979).

Our findings contribute to the literature in at least two ways. First, they extend the state of knowledge of the dynamic relationships between injunctive and descriptive social norms. Previous research in this field has focused mainly on interactions where norms are contradictory or congruent in a given setting and point in time (Lapinski and Rimal 2005; Rimal and Lapinski 2015). Our results instead illustrate an evolving dynamic in which injunctive norms first increase the corresponding descriptive norms, which then mediate the context-bridging effects of the injunctive norms. This study thus further develops the FTNC by demonstrating how dynamic normative processes over time shape norm emergence and shifts (Eriksson et al. 2015; Van Kleef et al. 2019).

Secondly, our findings add to research on how organizational practices can contribute to society's transition towards ecological sustainability (Schor 2004; Stephan et al. 2016; Hörisch 2018; Jaich et al. 2023) and they illustrate a pathway for how

businesses can help tackle societal grand challenges (Wickert et al. 2021; Gümüşay et al. 2022; Voegtlin et al. 2022). Our study thus responds to recent criticism regarding analyses on corporate environmental sustainability that employ mainly inward-looking perspectives and neglect impacts beyond organizational boundaries (Barnett et al. 2020). In this vein, this study is also contributing to research on contextual spillovers (Nilsson et al. 2017; Xu et al. 2020) by providing quasi-experimental support for the proposition that social norms can constitute a pathway for spillover (Nash et al. 2017).

Based on these contributions, our study also provides insights for managers as we demonstrate potential effects of corporate environmental practices beyond institutional boundaries which can have relevant impacts for corporate reputation, legitimacy, and stakeholder support. The rest of the article is structured in the following way: the next section provides the theoretical background of the analysis and derives the hypotheses; subsequently, the data, method, and results of our empirical study are presented; finally, we discuss the theoretical, managerial, and societal implications of our results and outline possible opportunities for future research.

2 Theoretical Background and Hypotheses

Every social group holds expectations for what is “normal” and “appropriate” to think and do (Stok and de Ridder 2019). These shared standards are referred to as social norms. They indicate how individuals should behave in certain social contexts and can be enforced through sanctions (Dequech 2009). The influence of social norms is considered to be one of the critical drivers of human behaviour (Stok and de Ridder 2019). However, scholars have also been criticizing the vagueness of the construct (Schwartz 1973; Marini 1984). In response to these concerns, Cialdini et al. (1990) developed the FTNC, a theoretical refinement of the concept of social norms. The FTNC draws on the proposition that individual behaviour in social situations stems from different motivational sources (Deutsch and Gerard 1955). This argument established the prominent distinction between injunctive and descriptive social norms, which has been widely adopted in the existing literature (e.g., Schultz et al. 2008; Jacobson et al. 2011; Morris et al. 2015; Stok and de Ridder 2019). Injunctive and descriptive norms differ in the information they communicate: injunctive norms indicate the social approval of a behaviour, while descriptive norms refer to the typicality or prevalence of a behaviour (Schultz et al. 2008; Jacobson et al. 2011).

According to the FTNC, distinguishing between these two types of information is important because they are relevant for different human motives. Individuals conform to injunctive social norms through their desire to gain social approval and to avoid disapproval by others (Jacobson et al. 2011). Thus, the influence of injunctive social norms is particularly powerful if specific contextual prerequisites like observability and normative expectations are met (Schultz et al. 2008; Farrow et al. 2017). A social context that fulfils both prerequisites, such as organizations, also contains the threat of sanctions for nonconforming behaviour, which maintains the corresponding norm (Dequech 2009). Descriptive social norms refer to the per-

ception of what is commonly done in a particular situation (Schultz et al. 2008; Jacobson et al. 2011). This type of information exhibits an epistemic authority that shapes individuals' understanding of how things are done (Van Kleef et al. 2019) and provides guidance for behaving effectively or accurately (Jacobson et al. 2011). Thus, conforming to descriptive social norms is less motivated by concerns about the evaluation of other group members but rather through a desire to behave correctly (Schultz et al. 2008).

2.1 Internalization of Social Norms

The capacity of humans to internalize social norms is an important factor in sustaining social cooperation (Ostrom 2000; Gavrilets and Richerson 2017). The more a norm is internalized, the less important are contextual factors for behavioural conformity (Farrow et al. 2017). If a social norm evolves into a personal norm, it becomes self-enforceable and thus independent of expectations by others (Manstead 2000; Thøgersen 2006; White et al. 2009; Leung and Morris 2015). In this case, conformity is still motivated by emotional rewards or sanctions. These, however, are individually enforced through internal disapproval or approval in the form of guilt, shame, or pride (Elster 1989; Farrow et al. 2017). Eventually, a fully internalized norm becomes associated with individual moral values and beliefs and is then followed unconditionally (Farrow et al. 2017). Thus, the internalization of social norms can also become a pathway for spillovers across contexts (Nash et al. 2017).

In this context, however, injunctive social norms are considered as being less likely to become internalized than descriptive social norms (Schultz et al. 2008; Bertoldo and Castro 2016). Descriptive social norms provide standards against which individuals can compare their own behaviour. The influence of such normative benchmarks can transcend both time and contexts, which, in turn, supports their internalization (Schultz et al. 2008). Injunctive social norms, instead, derive their influence from individuals' desire to gain approval, which is why compliance is particularly high in settings where reputational concerns are salient (Jacobson et al. 2011; Van Kleef et al. 2019). This proposition concerning the influence of injunctive social norms primarily in contexts in which the norm is salient and behaviour can be witnessed is widely shared in the academic literature (Miller et al. 1999; Kallgren et al. 2000; Schultz et al. 2008; Jacobson et al. 2011). However, this perspective might be too narrow as dynamic interactions between injunctive and descriptive social norms could carry their effects across time and contexts. We will further elaborate on these considerations in the following sections.

2.2 Pro-Environmental Injunctive Social Norms at Work

When entering a social setting, individuals need to decide how to behave, and contextual cues help them to interpret the situation by making social norms salient (Cialdini and Trost 1998). They provide information about what the appropriate behaviour is, how others can be expected to behave, and how one is supposed to act oneself (Bicchieri 2006).

In an organizational context, employees derive the expected behaviour from cues such as managerial practices, organizational procedures, or work routines (Thornton 2004; Blay et al. 2018). EMP, such as environmental reporting, sustainable work routines, or recycling procedures, make injunctive social norms salient and imply that the organization approves PEB (Norton et al. 2014). Employees who desire social approval are motivated to conform to such norms by behaving in an environmentally friendly way at work. This influence of injunctive norms on the behaviour of individuals within the context of their employing organization has been widely discussed in the existing literature (Rasmus and Steger 2000; Norton et al. 2014; Paillé and Raineri 2015; Raineri and Paillé 2016). Furthermore, the impact of injunctive social norms can increase the role of pro-environmental descriptive social norms within the organization, since PEB among co-workers becomes more observable.

2.3 The Mediating Role of Descriptive Social Norms Among Co-Workers

Descriptive social norms have been identified as a strong influence on PEB. In their seminal study, Cialdini et al. (1990) found that individual littering depends on the perceived littering behaviour of others. Similarly, Schultz et al. (2007) showed that information on the energy consumption of their neighbours reduced consumption among individuals who had been using comparably more energy before. Likewise, research that tracked household recycling revealed that individuals are sensitive to what others do and that those perceptions predict their own recycling behaviour (Huber et al. 2020). Moreover, recent research on drives of pro-environmental activism of young people demonstrated that perceiving peers participating in the so-called Fridays for Future movement was strongly related to one's own participation in the movement (Wallis and Loy 2021). Furthermore, Lindström et al. (2018) experimentally demonstrated how common behaviour followed by many can gain normative status. Together, these findings support the proposition that perceptions of what is commonly done by others shape the behaviour of the observer (Gross and Vostroknutov 2022). This influence can transcend both time and contexts if the corresponding norms are internalized as intrinsic motivations (Schultz et al. 2008). Accordingly, we assume that pro-environmental descriptive social norms at work may positively affect employees' self-reported private sphere PEB.

Where the descriptive social norms have been increased beforehand through injunctive social norms (such as perceived EMP), the descriptive social norms serve as a mediator for the influence of the injunctive social norms. EMP at work imply that an organization approves PEB (Norton et al. 2014) and, thus, provide important cues about which behaviour will allow one to affiliate with his/her work environment (Stok and de Ridder 2019). In line with these thoughts, recent research has demonstrated that corporate pro-environmental policies, sustainability practices or perceived organizational support for the environment increase the PEB of employees at work (Wesselink et al. 2017; Afsar et al. 2018; Sabbir and Taufique 2022). This, in turn, increases pro-environmental descriptive social norms within the organization as more employees increasingly behave environmentally friendly at work (Norton et al. 2014).

When co-workers are acting in an environmentally friendly way at work, they exemplify normative standards recognizable for their associates. If the corresponding norms are internalized by the observer as intrinsic motivations, conformity becomes self-enforceable, which can provide a pathway for contextual spillover on employees' private sphere PEB.

Based on this reasoning, our study is based on the following research hypotheses:

Hypothesis 1: Perceived EMP have a positive effect on employees' self-reported private sphere PEB.

Hypothesis 2: Descriptive social norms among co-workers mediate the positive effect of perceived EMP on employees' self-reported private sphere PEB.

3 Method and Results

For the sake of increased justification for causal inferences, scholars have advocated mixed methods based empirical approaches (Molina-Azorin 2012; Eden 2017). In line with these considerations, we conducted a survey and quasi-experimental study to test our hypotheses. Both studies were part of a larger research project on employee-level reactions to organizational environmental practices (Jaich 2022; Jaich et al. 2023).

The investigations were carried out in the German tourist industry. This context is suitable for our research objectives for two reasons. First, the tourist industry has a low technical specialization and since EMP are similar across different organizational fields (Gil et al. 2001), it can be argued that insights from this sector can be transferred to other types of organizations. Second, the tourist industry is facing growing pressure to become more sustainable (Dos Santos et al. 2017). In response, an increasing number of tourist companies have begun to implement EMP (Gürlek and Tuna 2019; Babiak and Trendafilova 2011) which creates a fertile field for related empirical research.

3.1 Study 1

Our first empirical study employed a cross-sectional survey among employees of nine small and medium-sized organizations (SMEs) from the tourist sector in northern Germany. Our sample included five hotels, two service agencies, and two tourist attractions. We focused on SMEs because they constitute the largest category of enterprises in Germany (Söllner 2014) and employed 55% of the total German labour force across all industries in 2020 (Destatis 2023). We initially approached 11 organizations and received rejections from two companies.

Data collection took place in August and September 2016. In total, we distributed 482 questionnaires, of which 278 (57.7%) fully-answered questionnaires were returned. Since many tasks in the tourist sector do not involve desk work, employees do not necessarily have corporate email addresses. Therefore, we chose to distribute paper-pencil questionnaires, a method which is not (Davidov and Depner 2011; Vleeschouwer et al. 2014), or is only marginally (Ward et al. 2014), invariant to online surveys. For the purpose of this study, we were only interested in data

from employees with more than 10 working hours per week and an employment relationship of more than one year. Subjects that did not fulfil these requirements were excluded from further analysis. The final sample size comprised 206 individuals, of which 63.3% were female.

To prevent potential common method variance, we applied several procedural remedies in line with recommendations by Podsakoff et al. (2003) and Conway and Lance (2010). First, we employed well-established measures with no conceptual intersection in survey items. Second, we secured participants' anonymity by avoiding questions requiring the disclosure of any exact figures regarding the duration of employment or household income. Instead, we used items that reflected a range of values. Further, the questionnaires were placed in sealed envelopes to prevent data access by managers or co-workers. An accompanying letter assured confidentiality and stressed that no one but the research team would have access to the data. Third, since this study was part of a larger research project, the questionnaire included additional items with different scale endpoints, which reduced the likelihood of method biases caused by commonalities in response options and anchor effects.

Despite these procedural remedies, we also employed statistical approaches in order to address common method risks. The research model included a non-linear interaction term, which reduces the risk of common method variance because it is less likely to be part of the subjects' theory-in-use (Chang et al. 2020). Ex post, we employed Harman's test, which showed that a single-factor solution explained 22.97% of the variance for our data, suggesting that common method bias is not likely to be a confounding factor in this study.

3.1.1 Measures

Unless otherwise indicated, all questionnaire items used a 5-point Likert-type response scale from 1 for "strongly disagree" to 5 for "strongly agree". For the translation of the items from English to German, a committee approach was applied involving two professional translators to produce a consensual translation (Sperber 2004). All items of the questionnaire are displayed in the Appendix.

Eleven items adapted from Molina-Azorin et al. (2008) were used to measure perceived EMP. Cronbach's alpha was calculated at 0.90. Sample items included: "Our company gives priority to purchasing ecological products (biodegradable, reusable, recyclable, ...)"; "Our company reduces the use of toxic and unsustainable products"; and "Our company gives priority to the utilization of renewable energies like green electricity".

Four items adapted from Norton et al. (2014) were used to measure pro-environmental descriptive social norms among co-workers. Cronbach's alpha for this measure was 0.91. Sample items included: "In our company, my co-workers are concerned about acting in environmentally friendly ways"; "In our company, my co-workers care about the environment"; or "In our company, my co-workers pay attention to environmental issues".

In the literature on PEB, concerns have been expressed regarding measures of PEB which focus on activities that do not significantly affect environmental problems (Armel et al. 2011). In response, items were defined that concentrate on behaviour

Table 1 Measures of central tendency, standard deviations, and correlations among study variables

	1	2	3	4	5	6	7
<i>Gender</i>							
<i>Duration of employment^a</i>	0.083*						
<i>Education^a</i>	0.006	0.143*					
<i>Household income^a</i>	0.099	0.136	0.076				
<i>PEB</i>	-0.058	0.264***	0.196*	0.267***			
<i>Descriptive social norms</i>	-0.041	0.136**	0.149	0.168	0.322***		
<i>EMP</i>	0.114	0.145*	0.108	0.128	0.233***	0.625***	
M/Mdn		4–6 years	Completed apprenticeship	2000–2500 €	3.720	3.551	3.341
SD					0.532	0.897	0.887

Gender is coded 0 for female and 1 for male

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

^a Ordinal measurement with Spearman rank correlation and median as measure of central tendency.

which is critical for the individuals' ecological footprint (Markle 2013). Nine items were adapted from a scale developed by Whitmarsh and O'Neill (2010) that showed high internal consistency, where Cronbach's alpha was 0.92. These self-reported PEB items were measured using a 5-point Likert scale ranging from 1 ("never") to 5 ("always"). Sample items included: "How often do you turn off lights or electronic devices that you are not using?"; "How often do you buy environmentally-friendly products?"; and "How often do you eat food that is organic, locally-grown, or in season?"

As shown by Milfont (2009) Vesely and Klöckner (2020), social desirability concerns have almost no effect on people's response to self-reported measures of PEB. Since the quasi-experimental research design in study 2 involved a control group, we decided to not employ a social desirability scale.

3.1.2 Descriptive Statistics

The descriptive statistics and correlations between the study variables are summarized in Table 1.

3.1.3 Results

We predicted a positive relationship between perceived EMP and employees' self-reported private sphere PEB (H1) via descriptive social norms among co-workers (H2). To test for the hypothesized relationships, effects were modelled using the PROCESS macro for SPSS developed by Hayes (2017), which yields unstandardized coefficients for all paths as well as total, direct and indirect effects. Indirect effects were calculated using bootstrapping with 5000 samples (Shrout and Bolger

Table 2 Path coefficients for the mediation model study 1

	Path coefficients					R^2
	Path	B	p	SE	95% CI	
$EMP \rightarrow$ Descriptive social norms	a	0.639	<0.001***	0.056	[0.529, 0.749]	0.40
Descriptive social norms \rightarrow PEB	b	0.178	<0.001***	0.052	[0.075, 0.281]	0.11
$EMP \rightarrow$ PEB						
Direct effect	c'	0.034	0.531	0.053	[-0.072, 0.139]	
Indirect effect	Ab	0.114		0.036	[0.048, 0.188]	
Sum of effects	c	0.147	<0.001***	0.043	[0.063, 0.231]	0.05

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

2002), which makes no assumptions about the distributional properties of the sample (Preacher et al. 2007). We found that perceived EMP had a positive direct effect on the descriptive social norms among co-workers. Descriptive social norms among co-workers, in turn, predicted employees' self-reported private sphere PEB. In line with our hypotheses, we observed a positive, fully mediated effect of perceived EMP on employees' self-reported private sphere PEB through descriptive social norms among co-workers, $ab = 0.114$, 95% CI [0.048, 0.188]. Table 2 summarizes the results of the mediation analysis and Fig. 1 illustrates the results graphically.

3.2 Study 2

According to Bitektine et al. (2018), experiments are the most suitable method for examining the role of contextual factors in social interactions. Thus, we employed a quasi-experimental field study in study 2 in order to rule out rival hypotheses and verify the hypothesized causality of the research model.

In this context, a high degree of experimental and mundane realism increases the external validity of field experiments (Gefen and Ridings 2002; Grant and Wall 2009) and allows for an examination of whether the results can be extrapolated to the wider population (Carpenter et al. 2005). However, in experimental field studies, isolation cannot be established to the same degree as in laboratory experiments. This is because research conditions in the field—especially for naturally occurring experiments—mostly prevent the random assignment of subjects to experimental settings (Levitt and List 2009). Thus, field studies mostly only allow quasi-experimental designs which are limited to measuring plausible causation (Cook et al. 2002). However, the involvement of a control group in the research design addresses primary threats to internal validity (such as maturation or alternative explanations for the observed effects) by enabling the detection of secular trends or sudden changes similar to the ones in the treatment group (Campbell and Stanley 1963).

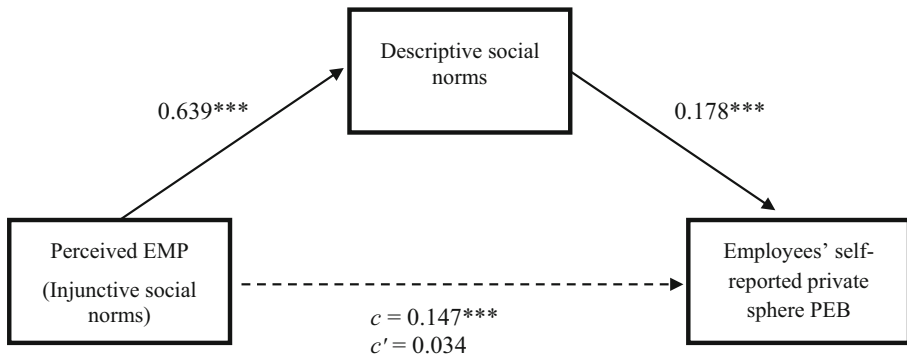


Fig. 1 Mediation model study 1. Unstandardized regression coefficients are reported ($*p < 0.05$, $**p < 0.01$, $***p < 0.001$; dashed lines represent insignificant regression coefficients)

3.2.1 Research Setting and Participants

The design of the quasi-experimental field study involved a treatment and a control group. The treatment group comprised 38 employees of the im-jaich oHG, a tourist service company that operates hotels, holiday cottages, marinas, and restaurants in nine different locations along the German coastline. In 2016, the management of the company decided (in consultation with the researchers of the present study) to implement EMP in order to reduce the organization's ecological footprint, which provided a fertile setting for a quasi-experimental design. Prior to this, no systematic EMP were employed and environmental issues were of no particular concern to the company. EMP were first implemented in two hotels, which acted as the treatment group in the experiment. Both hotels are located in Bremerhaven, a city on the German North Sea coast.

The control group consisted of 57 employees of a different business unit in the im-jaich oHG and the Hotel Amaris in Bremerhaven. The im-jaich control group unit is located on the island of Rügen in the Baltic Sea and includes 58 vacation components. The Hotel Amaris in Bremerhaven is independently operated by the Hotel Amaris GmbH and does not belong to the im-jaich oHG. It is located in a different area of the city to the im-jaich oHG hotels. According to the classification scheme of the hotel reservation system, HRS, the service standard of all involved business units in this study is comparable, with three stars for each unit.

It is common in pretest-posttest designs in real-world settings that not all participants complete the assessment during both rounds of data collection (May et al. 2014). In this study, 62 of the 95 participants who completed the questionnaire in the first round also completed it in the second round of data collection. One additional participant was removed from the sample due to unanswered survey items. The final sample consisted of 30 participants in the treatment group and 31 participants in the control group. Table 3 shows the descriptive statistics for both the treatment and the control group.

In line with recommendations by Handley et al. (2018), to increase the internal validity of quasi-experiments, we collected pretest data and baseline characteristics

Table 3 Descriptive statistics

	Entire sample		Treatment		Control	
	N	%	N	%	N	%
<i>Gender</i>						
Female	48	78.7	22	73.3	26	83.9
Male	13	21.3	8	26.7	5	16.1
<i>Age</i>						
<20	5	8.2	1	3.3	4	12.9
20–29	15	24.6	8	26.7	7	22.6
30–39	18	29.5	8	26.7	10	32.3
40–49	15	24.6	9	30.0	6	19.4
50–59	5	8.2	3	10.0	2	6.5
60–69	3	4.9	1	3.3	2	6.5
<i>Education</i>						
Lower secondary school	3	5.0	2	6.7	1	3.3
Secondary school	21	35.0	14	46.7	7	23.3
High school (matriculation)	7	11.7	2	6.7	5	16.7
Apprenticeship	21	35.0	10	33.3	11	36.7
Master craftsman training	1	1.7	0	0.0	1	3.3
University degree	6	10.0	2	6.7	4	13.3
Other qualification	1	1.7	0	0.0	1	3.3

to evaluate the comparability of the experimental groups. To determine whether the treatment and control groups were statistically equal, demographic characteristics (gender, age, education, and household income) were examined. Monte Carlo simulated Pearson χ^2 tests for association (10,000 iterations) revealed no significant differences between age, education, and household income ($p > 0.05$). For gender, Fisher's exact test was used, which likewise did not identify significant differences ($p > 0.05$). As the control group consisted of employees from two different companies, the same tests were calculated for these sub-groups and these also showed no significant differences between age, education, household income ($p > 0.05$), and gender ($p > 0.05$).

Prior to the intervention, we also measured pro-environmental descriptive social norms among the participants' family members and friends with a 4-item scale adapted from Norton et al. (2014), since such descriptive social norms may affect participants' PEB (Robertson and Barling 2012; Videras et al. 2012). Cronbach's alpha for this measure was 0.85. An independent sample t-test revealed no significant differences between the experimental groups, $t(59) = 1.881$, $p = 0.065$.

3.2.2 Measures

Response scales and translation method were identical to those employed in study 1. Further, the same measures of perceived EMP, pro-environmental descriptive social norms among co-workers, and self-reported PEB were used. All were above the $\alpha = 0.70$ threshold for acceptable internal consistency reliability.

Table 4 Experimental manipulation

Practice field	Implemented EMP	Time period
Purchase of ecological products	Adjustment of purchasing policy: coffee, tea, cosmetics, eggs, jelly, honey, milk, wine, bread, cheese and meat were fully or partially replaced by ecological products and, if possible, were purchased from local producers Fish threatened with extinction were removed from the menu Paper and print products were replaced by FSC-certified items Hotel car with diesel engine was replaced with an electric car Teams' outfits were produced from organic cotton	Oct. 2016–Jun. 2017
Utilization of renewable energies	Energy supply was switched to green electricity To increase visibility of this practice, plug sockets were labelled correspondingly	Dec. 2016
Energy and water-saving practices	Water-saving fittings were installed in kitchens, guest bathrooms and washrooms All light bulbs were replaced with LED lights Changes in routines, such as turning off lights and computers or using equipment such as dishwashers and washing machines only when full, were implemented	Jan. 2017–Mar. 2017
Selective collection of solid waste	Ordinary dustbins were replaced with bins with separate containers for different types of waste Signs with corresponding instructions on selective collection were installed	Sept. 2016
Environmental collaboration with customers	Repair sets and tire inflators were provided for guests who travel by bicycle Vegetarian and organic options on the menu of the restaurants were increased Bins for the selective collection of waste were provided in guest rooms	Apr. 2017–Jun. 2017
Reduction in the use of packaging	Small packs on the breakfast buffet were replaced by larger dispensers The use of washing-up brushes with exchangeable brushes was established Routines for printing emails were adjusted Change in milk purchasing and delivery to a local producer in multi-trip bottles was implemented As an alternative to to-go cups for beverages, multi-use cups made from recycled materials were offered	Oct. 2016–Mar. 2017
Training for employees	A consulting agency provided a mandatory full-day seminar on pollution prevention and environmental protection in the hotel industry for all employees Employees were also asked to provide their own suggestions on how to improve the hotel's environmental performance	Mar. 2017
Use of ecological arguments in marketing campaigns	A special brochure describing the organizational environmental policies of the hotels in the treatment group was produced and placed in every guest room and in the reception areas All printed marketing material was marked with a label certifying CO ₂ -neutral production	Jun. 2017

Table 4 (Continued)

Practice field	Implemented EMP	Time period
Quantification of environmental savings and costs	An environmental consultancy investigated the total energy consumption of both hotels and produced a corresponding CO ₂ balance for the years 2015 and 2016 This balance was published in an environmental report and a brochure	Mar. 2017–Jun. 2017
Sponsoring of environmental protection activities	€ 3000 was donated to the environmental initiative “Moorland—Für Moor und Klima.” This organization re-cultivates and waterlogs former moorlands in the region in order to establish natural CO ₂ storage In exchange for the donation, “Moorland” provided CO ₂ compensation certificates to the company	May 2017

3.2.3 Experimental Manipulation

The manipulation as part of this quasi-experimental field study was based on a scale developed by Rasmus and Steger (2000) for measuring EMP. In our case, we employed a version modified for the hotel industry by Molina-Azorin et al. (2008). The scale specifies practice fields that are crucial for environmental impact in the hotel sector and was used by the management of the im-jaich oHG to improve the company’s environmental performance. For each item on the scale, related EMP were implemented in both hotels in the treatment group between September 2016 and June 2017. A summary of the experimental manipulation is shown in Table 4.

3.2.4 Data Collection

In September 2016, participants were asked to voluntarily take part in a sector-wide research project of a university by filling in a paper-pencil survey during work hours. They were not informed of the research hypotheses. As in study 1, questionnaires were circulated in sealed envelopes and an accompanying letter assured confidentiality. Questions based on demographic and family information enabled an anonymous identification number for each subject to match pretest and posttest data. Completed questionnaires were returned in a closed envelope to a special postbox.

The posttest was taken 12 months after the pretest. Such a long intervening period between measurements increased the risk of a reduced number of participants. However, this time was necessary for the interventions to become effective. The internalization of social norms is related to the process of habituation (Mercurio and Medema 2006). The time taken until new behaviour is adopted varies strongly between subjects. In their research, Lally et al. (2010) documented a range of 18 to 254 days for 62 individuals to reach automaticity for newly-adopted modes of behaviour in a real-world setting. The manipulation used in the present study began with the implementation of EMP a few days after the pretest. The last EMP were implemented three months before the posttest.

3.2.5 Demand Effects

Demand effects refer to “changes in behaviour by experimental subjects due to cues about what constitutes appropriate behaviour” (Zizzo 2010, p. 76). For subjects to be demand-biased, three conditions must be fulfilled. First, they must encode a demand cue pointing to the research hypothesis. Second, they must discern the correct hypothesis. Third, they must act on it in terms of biased responses on dependent variable measures (Shimp et al. 1991). In order to hamper subjects’ abilities to encode a demand cue, we employed two techniques for non-deceptive obfuscation as recommended by Zizzo (2010). First, the interaction with subjects (e.g., the letter accompanying the questionnaire) was carried out using neutral, context-free language and filler questions with no reference to the research hypotheses were employed in the questionnaires. Second, the relatively long intervening period between the pretest and the posttest disguised the experimental connection between measurements (Zizzo 2010).

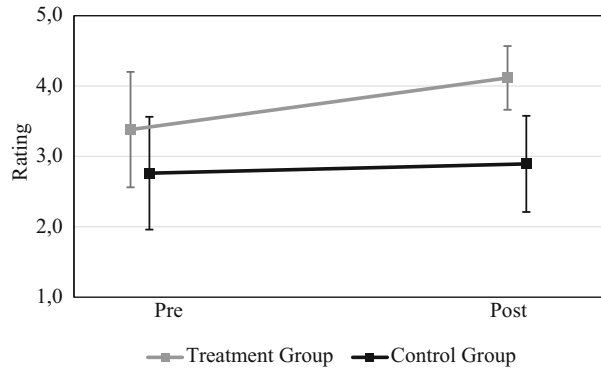
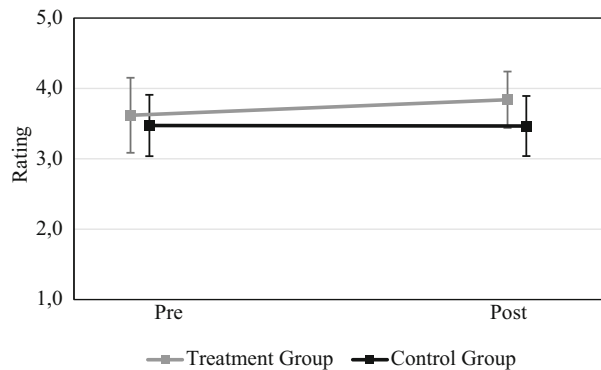
Nevertheless, after the second measurement, a post-experimental inquiry was conducted in the treatment group to determine whether a hypothesis was discerned. According to Blackhart et al. (2012), the honesty of participants is lower when post-experimental questions are presented by the researcher in person. In line with their recommendations, the inquiry was therefore carried out through a paper-pencil questionnaire asking participants to describe the purpose of the study in their own words. No participant identified the experimental hypothesis in the post-experimental inquiry.

3.2.6 Test of Selection Effects

In order to control whether a selection bias confounded the experimental outcomes, pretest measures of the dependent variable in private sphere PEB were examined. An independent sample t-test revealed no significant differences between the experimental groups, $t(59) = 1.168, p = 0.248$.

3.2.7 Manipulation Check

A successful experimental manipulation was expected to result in an increased employees’ perception of EMP in the treatment group business unit. Thus, to evaluate whether the experimental manipulation was successful, we analysed the perceived EMP between both groups before and after the manipulation (Bitektine et al. 2018). A separate 2×2 mixed ANOVA with treatment versus control as the grouping variable and pre versus post scores (time) as the repeated measure showed a significant interaction, $F(1, 59) = 12.949, p = 0.001, \eta_p^2 = 0.180$, as well as a significant main effect for group, $F(1, 59) = 33.078, p < 0.001, \eta_p^2 = 0.359$, and time, $F(1, 59) = 26.816, p < 0.001, \eta_p^2 = 0.312$. Homogeneity of the error variances was assessed using Levene’s test, which showed equal error variances ($p > 0.05$). For significance tests, post-hoc Bonferroni-corrected t-tests between both points of measurement in each group were calculated and revealed a significant effect for the treatment group, $t(29) = -5.867, p < 0.001$, but not for the control group, $t(30) = -1.186, p = 0.490$.

Fig. 2 Perceived EMP**Fig. 3** Self-reported private sphere PEB

The results of the manipulation check, detailed in Fig. 2, provide strong support for a successful experimental manipulation. The effect size of the interaction ($\eta_p^2 = 0.180$) was well above the threshold of 0.14 for a large effect according to Cohen (1977).

3.2.8 Results

A 2×2 mixed ANOVA, used to analyse whether the self-reported private sphere PEB of the treatment group increased compared to the self-reported PEB of the control group, revealed a statistically significant interaction, $F(1, 59) = 5.138$, $p = 0.027$, $\eta_p^2 = 0.080$, as well as a significant main effect for groups, $F(1, 59) = 6.204$, $p = 0.016$, $\eta_p^2 = 0.095$, and time, $F(1, 59) = 4.512$, $p = 0.038$, $\eta_p^2 = 0.071$. Levene's test to assess homogeneity of the error variances showed equal error variances ($p > 0.05$). Post-hoc Bonferroni-corrected t-tests between both points of measurement in each group yielded a significant effect for the treatment group, $t(29) = -3.559$, $p = 0.003$, but not for the control group, $t(30) = 0.091$, $p > 0.999$.

The analysis, detailed in Fig. 3, supports hypothesis 1. The effect size of the interaction ($\eta_p^2 = 0.080$) was well above the threshold of 0.06 for a medium effect according to Cohen (1977).

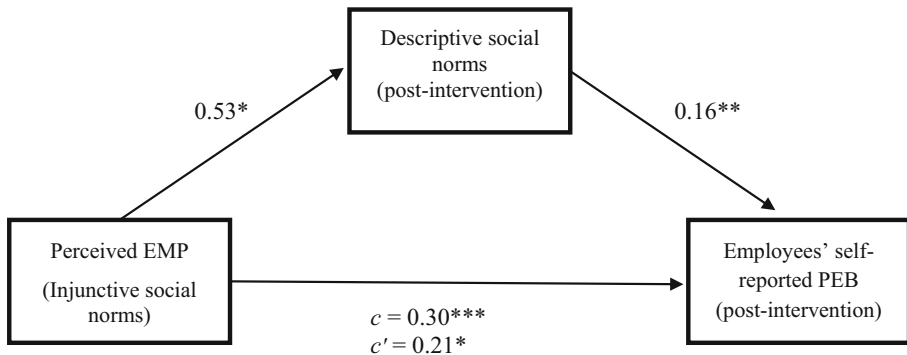


Fig. 4 Mediation model study 2. Unstandardized regression coefficients are reported; model includes private sphere PEB pre-manipulation scores and descriptive social norms pre-manipulation scores as covariates (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$)

To analyse whether the positive effect was mediated via descriptive social norms among co-workers as predicted in hypothesis 2, relationships were modelled using Hayes (2017) PROCESS macro for SPSS. Bootstrapping with 5000 iterations was used to calculate indirect effects (Shrout and Bolger 2002), with no assumptions about the distribution properties of the sample (Preacher et al. 2007). Analyses showed that perceived EMP had a positive direct effect on descriptive social norms among co-workers that subsequently predicted self-reported private sphere PEB (Fig. 4). Thus, we found that the relationship between perceived EMP and self-reported PEB is partially mediated by descriptive social norms among co-workers, $ab = 0.08$, 95% CI [0.02, 0.17]. All path coefficients are summarized in Table 5.

In summary, the analyses conducted in study 2 indicate that no systematic pre-existing group differences biased the results of this quasi-experiment. Moreover, the analyses confirm a successful experimental manipulation and provide support for both research hypotheses.

4 Discussion

In this study, we employed a mixed methods approach to empirically test whether injunctive social norms relating to perceived EMP shape individual behaviour beyond organizational boundaries in unrelated, subsequent contexts. The findings of a cross-sectional analysis revealed a positive association between perceived EMP and employees' self-reported private sphere PEB. The results of a subsequent pretest-posttest quasi-experimental field study verified the hypothesized causality and minimized the possibility of alternative explanations. Furthermore, it was predicted that the effect of perceived EMP on employees' self-reported private sphere PEB is mediated via pro-environmental descriptive social norms among co-workers. While the analysis of the cross-sectional data indicated a full mediation, the results of the quasi-experimental data revealed only a partial mediation. Hence, our findings imply that the mechanism of descriptive social norms only partially accounts for the

Table 5 Path coefficients for the mediation model study 2

	Path coefficients					R^2
	Path	b	P	SE	95% CI	
<i>EMP</i> → <i>Descriptive social norms</i>	a	0.53	0.010*	0.20	[0.13; 0.94]	0.24
<i>Descriptive social norms</i> → <i>PEB</i>	b	0.16	0.004**	0.05	[0.05; 0.26]	0.57
<i>Covariates</i>						
Descriptive social norms (pre) → Descriptive social norms (post)		0.20	0.017*	0.14	[-0.09; 0.49]	
Descriptive social norms (pre) → <i>PEB</i> (post)		0.39	0.089	0.22	[-0.06; 0.83]	
<i>PEB</i> (pre) → <i>PEB</i> (post)		0.48	<0.001***	0.09	[0.30; 0.67]	
<i>PEB</i> (pre) → Descriptive social norms (post)		-0.03	0.892	0.22	[-0.48; 0.42]	
<i>EMP</i> → <i>PEB</i>						
Direct effect	c'	0.21	0.015*	0.08	[0.04; 0.38]	
Indirect effect	Ab	0.08		0.04	[0.02; 0.17]	
Sum of effects	c	0.30	<0.001***	0.09	[0.13; 0.47]	0.50

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

relationship between perceived EMP and employees' self-reported private sphere PEB (Rucker et al. 2011). We elaborate on these findings below and discuss theoretical, managerial and societal implications of our study, as well as limitations and opportunities for future research.

4.1 Theoretical Implications

This research contributes to the literature in several ways. First, it further develops the FTNC by expanding our understanding of the interactions between different types of social norms and how such dynamics extend the norms' scope of influence. Our results revealed that injunctive social norms at work can shape behaviour beyond their initial context via descriptive social norms among co-workers. This finding challenges the prominent proposition that the influence of injunctive social norms is limited to settings in which the norm is currently salient and behaviour is observable (Miller et al. 1999; Kallgren et al. 2000; Schultz et al. 2008; Jacobson et al. 2011). Even though social norms are tied to locations, individuals who internalize them can carry their influence to subsequent contexts. Thus, a comprehensive understanding of normative influence needs to recognize those dynamic processes through which the impact of social norms progresses across time and contexts.

Previous analyses revealed that descriptive social norms are comparatively more predictive of behaviour than injunctive norms (Thøgersen 2008; Huber et al. 2020). However, as demonstrated in the present study, injunctive social norms can trigger descriptive norms which then leverage the influence of the injunctive norms. Thus, injunctive social norms become more significant through mediation effects resulting from norm interactions. This finding sheds light on the critical role that businesses have for the rise and dissemination of social norms. Within organizations, employees frequently experience injunctive social norms via management practices, policies, or regulations (Norton et al. 2015), which are reinforced through expectations of superiors and rewards for social coordination (Centola et al. 2018). If these norms become internalized, their influence exceeds organizational boundaries. Insights into such spillovers add to research on the interplay between organizational practices and societal transitions (Stephan et al. 2016; Hörisch 2018). Drawing on the concept of society as an inter-institutional system (Friedland and Alford 1991; Thornton 2004), employees who carry over social norms from one societal sector (companies) to another (families) can be regarded as diffusion agents for standards of behaviour. On the one hand, these individuals replicate social norms through conforming social interactions within organizational contexts (Hallett and Ventresca 2006; Powell and Colyvas 2008), while on the other hand, they support the dissemination of these norms by importing practices from one social context to another (Thornton and Ocasio 2008; Purdy and Gray 2009).

Second, our results are beneficial for institutional theory related research on corporate pro-environmentalism. In this field, researchers have, for example, employed institutional logic perspectives to explain why and how pro-environmental corporate logics shape PEB within organizations (Schick et al. 2016; Seidler et al. 2017). Logics are conceptually overlapping with social norms. They refer to frames of reference that allow actors to make sense of their social context (Thornton 2004; Greenwood et al. 2010). A pro-environmental corporate logic fosters employees' PEB at work similar to injunctive social norms by providing assumptions about what constitutes appropriate behavior (Schick et al. 2016; Seidler et al. 2017). While such inquiries have refined insights into the interplay between logics and individual actors within the organizational context, less work has been devoted to the question of whether intraorganizational logics can shape individual behavior beyond organizational boundaries in different, unrelated settings (Glaser et al. 2016). In this context, our results illustrate corresponding spillover effects on subsequent contexts and, thereby, differentiate the understanding and analysis of the diffusion process of institutional logics (Purdy and Gray 2009).

Third, besides these contributions to the wider literature on social norms and institutional logics, our findings are also beneficial for research on spillover in the context of PEB. Most of the existing research in this field has used correlational studies that demonstrate co-occurrence between behaviours (Culiberg and Elgaaied-Gambier 2016; Nash et al. 2017). Such methods do not provide causal evidence as reverse causality and the influence of common factors cannot be ruled out (Thøgersen 2012). Thus, scholars in this field insistently call for experiments to further investigate the causes of PEB (Whitmarsh and O'Neill 2010; Thøgersen 2012; Truelove et al. 2014; Norton et al. 2015; Xu et al. 2020). The present study meets these de-

mands and offers quasi-experimental support for the assumption that social norms can constitute a pathway for contextual spillovers (Nash et al. 2017).

4.2 Managerial Implications

This study also offers practical implications for managers who are responsible for the adoption and implementation of EMP. We found that corresponding social norms can be internalized by employees, which is relevant because the more a norm is internalized, the stronger is the motivation for compliance and this reduces the costs for incentives (De Groot and Steg 2010), controlling, and monitoring activities. Furthermore, our research demonstrates that the implementation of EMP can cause contextual spillovers with consequences beyond the formal boundaries of the organization. Such insights provide important information for the assessment of the adoption of such practices. For example, managers wishing to reduce the ecological footprint of their organization could consider the additional benefits of EMP through the increased PEB of their employees. This could, for instance, strengthen organizational environmental legitimacy (Bansal and Clelland 2004), which has gained relevance in recent years since stakeholders' evaluations of organizational practices increasingly take environmental issues into account (Berrone et al. 2017; Berrone and Gomez-Mejia 2009).

4.3 Societal Implications

Our research further offers insights that could help with the analysis of and ability to cope with ecological grand challenges like the global environmental degeneration or climate change (Ferraro et al. 2015). Such challenges require the implementation of PEB in multiple domains of action (Nyborg et al. 2016). However, individuals may be reluctant to change their behaviour because PEB can be more costly or inconvenient than less environmentally friendly options (Kollmuss and Agyeman 2002). Furthermore, the dissemination of PEB can be hampered by concerns of injustice due to potential benefits for free-riders (Duit 2011; Perry et al. 2021). Yet, social norms can help to solve such problems and guide behaviour by clarifying shared understandings of what is acceptable and what is not (Ostrom 2000). In this context, recent studies have explored tipping dynamics caused by social norms leading to contagious and fast-spreading processes of social change (Nyborg et al. 2016; Centola et al. 2018; Otto et al. 2020). A shared finding of these analyses is that “a small change or intervention in the subsystem can lead to large changes at macroscopic level” (Otto et al. 2020, p. 2355). Media, spiritual leaders or young generations are seen as key actors that are able to drive such social tipping dynamics (Otto et al. 2020). Against this background, our results indicate that organizations also can function as amplifiers for such dynamics, since contextual spillovers provide the potential to scale up effects of intra-organizational social norms on wider societal levels. This mechanism could be utilized by policy-makers through incentivizing the greening of organizations or by making examples of corresponding organizational behaviour more visible.

4.4 Limitations and Future Research

There are limitations to this study which could be addressed in future research. Our investigation did not cover the question of how norms that have been transferred from the corporate context to the private sphere further develop within the new social setting. Following the ideas of Friedland and Alford (1991), different societal sectors represent different sets of expectations for social relations and behaviour. Thus, newly imported behaviours could contradict the ancestral social norms of the new context, which might lead to interesting further social dynamics. To capture such further developments, a longitudinal approach could follow the transition of social norms across institutional boundaries and analyse potential behavioural impacts which might subsequently add up to new social norms in different contexts (Hedström and Swedberg 1996).

A further limitation relates to the fact that our findings only revealed a partial mediation, which could imply that injunctive social norms also directly influence employees' private sphere PEB. As employees spend time at work, they gain more experience with the normative expectations within the context of their employing organization and develop stronger personal associations with it (Glaser et al. 2016). This could lead to intrinsic compliance with injunctive social norms without any mediation mechanisms. Future research could, hence, focus on the intrapersonal level for a more fine-grained understanding of whether such developments take place and, if so, under which boundary conditions.

Another valuable contribution of future research would be the examination of whether the mechanisms detected in this study also hold in different settings or populations. We combined survey and quasi-experimental evidence from two independent field studies to increase the internal and external validity of our research (Eden 2017). A high degree of mundane realism in our field experiment also served this purpose (Gefen and Ridings 2002; Grant and Wall 2009). However, the empirical analysis was carried out within a specific industry and country. A study replication in different empirical contexts would, therefore, be desirable in order to verify the generalizability of results.

Finally, following previous investigations on PEP this study used self-reports as an indicator of individual behaviour (Kormos and Gifford 2014). Even though social desirability concerns have almost no effect on the response of individuals to self-reported measures of PEB (Milfont 2009; Vesely and Klöckner 2020), participants may overestimate the frequency of their PEB (Chao and Lam 2011; Kormos and Gifford 2014). Thus, researchers argue that direct observations of PEB are methodologically preferable (Lange and Dewitte 2019). However, observational methodological approaches are operationally challenging and ethically problematic (Markle 2013), especially in an initially undisclosed experimental setting. Furthermore, observational data can also be subject to confounding, selection and/or measurement biases (Hammerton and Munafò 2021). A future research design could, therefore, include a method triangulation because the combination of different empirical approaches reduces the risk of biased results and provides a strong basis for causal inferences (Ibid).

5 Conclusion

Research on the dynamics between different types of social norms that influence behaviour across social contexts is still in its infancy. Our investigation contributes to these research efforts by providing novel findings on the contextual spillover of injunctive social norms and the mediating role of descriptive social norms among co-workers. Such insights into inter-contextual mechanisms are crucial for a holistic analysis of corporate contributions to societal transitions. While much remains to be explored about how interactions between social norms within organizations influence employees' behaviour, this study provides a further building block towards a comprehensive understanding of such normative dynamics.

6 Appendix

6.1 Scales

6.1.1 EMP

Our company gives priority to purchasing ecological products (biodegradable, reusable, recyclable, ...).

Our company facilitates customer collaboration in environmental protection.

Our company reduces the use of toxic and unsustainable products.

Our company gives priority to the utilization of renewable energies, like green electricity.

Our company applies water-saving practices.

Our company applies energy-saving practices.

Our company gives employees training in environmental matters.

Our company uses ecological arguments in its marketing campaigns.

Our company organizes or sponsors environmental protection activities.

Our company has a long-term environmental approach.

Our company publishes reports on environmental savings and costs.

6.1.2 PEB

How often do you turn off lights or electronic devices you are not using?

How often do you walk, cycle or take public transport for short journeys (trips less than 5 km)?

How often do you buy environmentally-friendly products?

How often do you eat food that is organic, locally-grown, or in season?

How often do you avoid eating meat?

How often do you buy products with less packaging?

How often do you recycle?

How often do you reuse or repair items instead of throwing them away?

How often do you save water by taking shorter showers or turning off the tap while you brush your teeth?

6.1.3 Descriptive Social Norms Among Co-workers

In our company, my co-workers are concerned about acting in environmentally friendly ways.

In our company, my co-workers care about the environment.

In our company, my co-workers pay attention to environmental issues.

In our company, my co-workers try to minimize harm to the environment.

6.1.4 Descriptive Social Norms Among Family Members and Friends

My family members and/or friends are concerned about acting in environmentally friendly ways.

My family members and/or friends care about the environment.

My family members and/or friends pay attention to environmental issues.

My family members and/or friends try to minimize harm to the environment.

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