

Constraints and creativity at the workplace:
The role of constructive non-compliance

Master Thesis

Oana Catalina Salcescu

Supervisor: Dr. Paraskevas Petrou

Second Supervisor: Dr. Dimitri van der Linden

Erasmus University Rotterdam, Faculty of Social Science

Abstract

Constraints have been shown to have an inconsistent effect on creativity, sometimes hindering it and other times acting as triggers to creativity. To clarify this relationship, we explored how constraints force employees to solve problems, thereby leading them to be more creative at work in the face of obstacles. Thus, we identified and validated a new behaviour called constructive non-compliance (CNC) through which employees follow their own course of action and ignore rules or social norms in order to optimally pursue work-related goals. A questionnaire diary study was conducted with employees ($N = 170$) over three weeks. Results showed that both organizational constraints and CNC behaviour had a positive effect on creativity. Although CNC did not strengthen the relationship between organizational or job constraints and creativity as hypothesized, our results nonetheless show that triggers previously thought to be inhibitors of creativity, such as constraints and rule-deviating behavior, can lead people to be more creative. These findings have practical implications for managers, who can expend their effort by supporting employees to work within the existing constraints in the organization and make do with the resources which are available.

Keywords: constraints, creativity, constructive non-compliance, rule-breaking, deviance

Introduction

Creativity and innovation are highly sought after in organizations and in competitive markets (Amabile, 1988; Gabe, Florida, & Mellander, 2012). For companies to thrive and to survive, employers constantly search for outside-the-box thinkers to produce great new ideas, products, or services and consequently increase profits (Caniëls & Rietzschel, 2013; Cunha, Rego, Clegg, Neves & Oliveira, 2014). Until now, much of the research that has explored creativity has focused on its predictors – what spurs it, and how to avoid factors which have been widely thought to inhibit creativity (Amabile, 1996; Spector & Jex, 1998). In particular, constraints, which are limitations or restrictions in the environment that may impede performance, have been thought to be negative predictors of creativity (Amabile, 1988; Larson & Gobeli, 1989). However, in recent years constraints have received increasing attention as triggers of creativity rather than just as hindrances to it (Caniëls & Rietzschel, 2013; Cunha et al., 2014; Gibbert & Scranton, 2009; Mainemelis, 2010; Rosenzweig & Grinstein, 2015).

In fact, there is mounting evidence that constraints and creativity do not have to be mutually exclusive and examples of this are not hard to spot throughout history. Great innovations have occurred in jet propulsion engineering during the Second World War (Gibbert & Scranton, 2009), during energy crises (Cunha et al., 2014), and when discovering new ways to create electrical power (Rosenzweig & Grinstein, 2015). These innovations are the result of creative processes, all which occurred during times of both resource and rule constraints. Given that creativity is often the root of innovation (Alves, Marques, Saur & Marques, 2007; Rank, Pace & Frese, 2004), there is need for more clarity to understand in which circumstances constraints can lead to creativity (Caniëls & Rietzschel, 2013; Cunha et al., 2014). As one response to this lack of attention, Manemelis (2010) proposed the idea of creative deviance.

Creative deviance occurs in the workplace when an employee pursues a creative idea using company time and resources, despite their superior telling them to stop this pursuit. Take for example 3M's tape splitter and the Pontiac Fiero to name just two, which were both the result of employees working against constraints (in this case, their superior's orders) to produce innovative and game-changing products (Mainemelis, 2010). In some organizational cultures, the idea of challenging prescribed rules and procedures is even encouraged as a novel way to solve problems (Baucus, Norton, Baucus, & Human, 2008). Thus, it is clear that creativity can occur despite of and even because of constraints, but until now the literature on the role of constraints in creativity has been inconsistent. Some authors posit that constraints are inhibitors to creativity. For example, Glucksberg (1964) found that receiving a monetary reward

increased functional fixedness and therefore reduced creativity (Amabile, 1983). However, others have found that constraints trigger creativity, such as when they prevent taking the easiest path to a solution by forcing a creative alternative (Moreau & Dahl, 2005). These inconsistencies in the literature must be addressed in order to understand exactly how and when constraints have an effect on creativity.

In this paper, we build upon past research to further investigate the role of constraints and deviance in triggering creativity and to explore how individuals adapt their behaviour to the environment to deal with constraints (Amabile et al., 1996, 2006; Griffin & McDermott, 1998; Wolfradt & Pretz, 2001; Woodman & Schoenfeldt, 1989; Zampetakis, 2010). We propose that creativity can be a positive result of both organizational and job level constraints when employees engage in constructive non-compliance (CNC). CNC refers to behaviours through which employees follow their own course of action in order to optimally pursue work-related goals. This occurs even if it implies breaking rules and conventions or compromising social relationships. Examples of CNC behavior are ignoring advice from colleagues when this advice is considered to be inefficient, or violating work procedures that hinder work goals. CNC is one way for employees to fulfil their work duties despite job constraints such as completing tasks they do not enjoy and having conflict with colleagues (Veldhoven & Meijman, 1994), or organizational constraints like rules and prescribed procedures (Spector & Jex, 1998). We suggest that CNC moderates the link between both types of constraints and creativity, such that when people engage in CNC behaviours, constraints are a positive predictor of creativity. Further, we propose that CNC has a direct effect on triggering creativity due to its similarity with deviant behaviours. Until now, deviance has been thought to stimulate creativity although the link has not yet been empirically demonstrated (Mainemelis, 2010; Spreitzer & Sonenshein, 2004; Sternberg & Lubart, 1995).

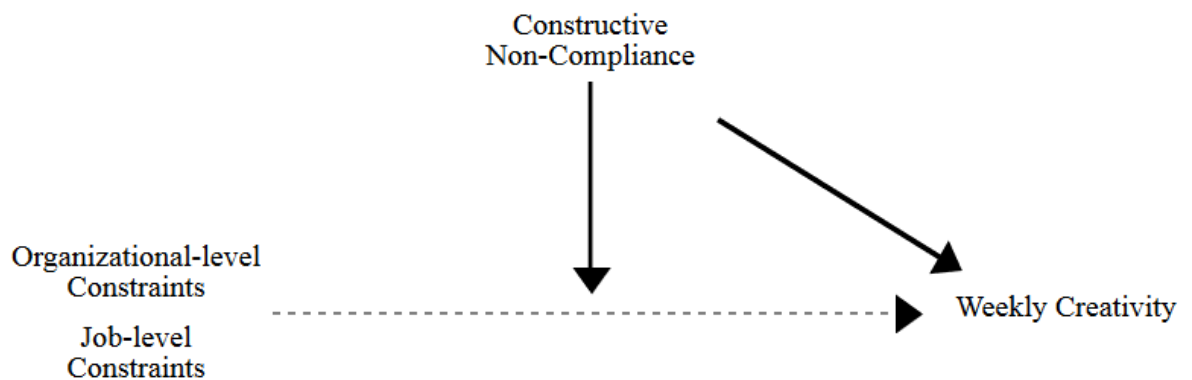


Figure 1. Hypothesized model

The present study has two aims. First, we describe the theoretical background of constructive non-compliance and validate a new measure of CNC. Second, we explain theoretically and explore scientifically how CNC is both a predictor of creativity and a moderator of the relationship between constraints and creativity, such that employees who engage in CNC are more creative at work.

Study 1

Conceptualizing constructive non-compliance

Building upon Mainemelis' (2010) concept of creative deviance, we identified a set of rule-breaking related behaviours which we termed constructive non-compliance (CNC). Through CNC, employees follow their own course of action and optimally pursue work-related goals in the face of hindrances at work. Even though employees often have great ideas at work, not all have the permission or ability to continue their work on them and some are told outright that they should stop (Mainemelis, 2010; Dahling, Chau, Mayer & Gregory, 2012). Despite this lack of permission from their superior, they are influenced or inspired to continue pursuing their ideas, and this pursuit can lead to creative outcomes (Mainemelis, 2010; Lin, 2013). We suggest that it is constructive non-compliant behaviour that some employees use which enables them to persist. We term the behaviour 'constructive' because despite not complying with rules, conventions and social norms, the reason for this is actually a productive one: to complete work goals or tasks, regardless of obstacles. At the same time, it is also 'non-compliant' because the person engaging in the behaviour is not complying either with organizational rules and procedures, or with the advice and recommendations from their colleagues or supervisors.

CNC occurs when the employee outright breaks rules or compromises social relationships, both which can be considered constraints in circumstances when they impede an individual from reaching their work goals (Baucus, Norton, Baucus, & Human, 2008). Thus, we propose that constructive non-compliance occurs on two levels. First, non-compliant behaviour can be directed toward rules or procedures mandated by the organization that employees should follow. Second, employees can also refuse to comply with the social norms of interpersonal relationships at work, which determine how individuals at work should interact with one another (Mainemelis, 2010). As a theoretical precedent to this two level distinction, we drew from job crafting, organizational structure, and innovation literature.

Job crafting involves employees changing their work at both the task and relational boundaries (Wrzesniewski & Dutton, 2001), and we liken the job crafting 'task' dimension to CNC's rule dimension. As Wrzesniewski and Dutton (2001) explain, tasks are "the most basic

building blocks of the relationship between employees and the organization” (p. 179). This idea is supported by Ilgen and Hollenbeck’s (1991) work in organizational structures. The authors define organizations as being comprised primarily by the task and functional systems. Tasks are subsets of functions which are combined into jobs, positions and roles. How an employee regards and approaches their tasks is influenced by the organizational rules that govern what tasks should be completed as well as the procedures to be followed when fulfilling tasks. When these rules or procedures are not optimal, some employees may feel restrained by their circumstances (O’Connor & McDermott, 2004). We believe that in these cases they will engage in CNC behaviour as a response to these constraints so that they can fulfill their tasks regardless. For example, if there is a specific work process outlined by the organization yet the employee comes up with a better and more efficient system, it would be more productive to ignore the process, thus not complying with the rules and instead using their own method.

There are also notable similarities between CNC other-deviance and the relational boundary of job crafting. Wrzesniewski and Dutton (2001) explain that employees are able to exercise some degree of control over their work by choosing who they interact with and how they do so. Again, Ilgen and Hollenbeck (1991) also support this dimension, explaining that a social system puts employees in definable groups and supports power, status and influence within the organization. These same principles are applied in the other-deviation dimension of CNC, where employees do not let themselves be governed by the advice or beliefs of others even though this might compromise their relationships. To illustrate, a colleague may recommend some advice or give feedback which the receiver disagrees with and may even think would endanger the quality of their work. In that case, they would be apt to ignore this advice and persevere with their original idea or choice because it would lead to the successful completion of their goals.

Combining both rule and other-oriented aspects is literature in innovative bootlegging, a process “by which individuals take the initiative to work on ideas that have no formal organizational support ... often hidden from the sight of senior management ... with the aim of producing innovations” (Criscuolo, Salter & Ter Wal, 2014, p. 1287). Whereas with CNC the purpose is to reach work goals in general by overcoming obstacles, bootlegging is specifically limited to research and development innovations. Employees engaging in bootlegging go against organizational rules that prohibit the pursuit of development ideas. They also go against the direct wishes of others, particularly their supervisors who would disapprove of their actions. Taking these precedents into account, we distinguished between deviation from rules and deviation from others when developing the items for the CNC measure. For example,

two rule-oriented items were “I am not afraid to break rules if that means I can conduct tasks better or faster,” and “My tasks work out better when I do them in my own way.” Other-oriented items included “If I have to, I disagree with others at work,” and “I find it helpful to deviate from what others think or do.” Accordingly, we hypothesized the following:

Hypothesis 1: The measure of CNC will have two factors – deviation from rules and deviation from others.

When introducing a new construct, it is also important to determine discriminant validity from others which are very similar (Reis & Judd, 2000).¹ One construct which has notable parallels with CNC is pro-social rule-breaking (PSRB) (Dahling, Chau, Mayer & Gregory, 2012; Morrison, 2006). PSRB occurs when “an employee intentionally violates a formal organizational policy, regulation, or prohibition with the primary intention of promoting the welfare of the organization or one of its stakeholders” (Morrison, 2006, p. 6). Unlike other rule-breaking constructs such as antisocial behaviour or workplace deviance, the nature of pro-social rule-breaking is not self-serving or caused by dissatisfaction or injustice, and it does not necessarily lead to a negative outcome for those involved.

While PSRB is related to CNC, there are key distinctions between the two which differentiate them. First, there are differences in regards to the reason for working around or violating rules. Whereas with PSRB the motivation is to promote organizational interests or help others, in the case of CNC behaviour one is motivated to break rules in order to perform their job in the face of constraints and obstacles. The priority is to fulfil work goals regardless of organizational rules or social niceties. Second, as with CNC, PSRB distinguishes between rule and norm breaking, the former being organizationally mandated whereas the latter is determined and controlled by the social environment in the workplace (Morrison, 2006). However, PSRB focuses exclusively on the formal rules of the organization and the breaking thereof by the employee. CNC goes beyond organizational rules and also captures the social norm aspect of the work environment, giving it the ability to capture both formal rule and informal norm breaking.

Finally, CNC has two dimensions that define the type of non-compliance which the employee engages in: deviation from organizational rules or deviation from others, namely superiors or coworkers. In contrast, PSRB has three dimensions for whom the rule breaking actually benefits – either coworkers, clients, or the organization (by improving efficiency)

¹ While we acknowledge that bootlegging has some similarities to CNC, considering the items of the bootlegging scale we find that it is too specifically focused on research and development projects that it lacks convincing comparability to CNC. For this reason, we did not determine discriminant validity.

(Dahling, Chau, Mayer & Gregory, 2012). The coworker and client dimensions are focused on how the employee's behaviour can benefit the relationships with these parties rather than how it can forward the employee's own goals. The efficiency dimension is more closely linked to the deviation from rules dimension of CNC because it deals with working most proficiently despite rules, yet there is still more emphasis on how these actions will benefit the organization rather than the employee due to increased performance. In contrast, the focus of CNC is on achieving the end goal of fulfilling an employee's own work duties, regardless of potential benefit for the organization. Thus, although there are some similarities between the two constructs, due to the distinguishing features from PSRB, we hypothesize that:

Hypothesis 2: There is a moderate, positive correlation between constructive non-compliance and pro-social rule-breaking.

CNC also has some similarities with rebelliousness (Cloninger, Przybeck & Svrakic, 1994). Rebelliousness is a personality trait characterized by the preference for "repudiating traditional lines of thought, values and experience and to embrace alternative ones" (Griffin & McDermott, 1998). Unlike CNC however, rebelliousness is not specific to tasks and relationships at work. Furthermore, rebelliousness is particularly in response to reduced autonomy (Pasikowski, 2013) or against a particular external agent (McDermott & Barik, 2014), whereas CNC is a response to a variety of possible agents or circumstances in the environment that extend beyond just restricted autonomy or the actions of others. Typically, rebelliousness is seen exclusively as a negative and delinquent type of deviance (Eve, 1978), while CNC could be considered as either positive deviance or deviance which cannot be evaluated as positive or negative until the outcome is achieved (Lin, 2015; Mainemelis, 2010; Spreitzer & Sonenshein, 2004). Rebellious individuals either reject "legitimate goals ... as desirable or attainable ... or [attempt] to obtain legitimate goals by illegitimate means" (Eve, 1978, p. 115). While CNC behaviour is not aimed at rejecting legitimate goals and tasks of the workplace, it does necessitate reaching goals by what would be considered illegitimate means because breaking rules and foregoing social norms are likely to be frowned upon by the organization.

Not only that, but the motivation for rebellious behaviour compared to CNC behaviour is also very different. CNC is motivated by wanting to fulfill or complete work goals with which they are presented. In contrast, rebelliousness is characterized by "wanting or feeling compelled to do something contrary to that required by some external agency" (Apter, 1982), which is not entirely the case in CNC behaviour. Rebelliousness is more restrictive and more specific. In CNC circumstances, the deviating behaviour can be in response to a context or

situation beyond just rules or authority. For example, a constraint such as lack of resources or money may not be caused by a particular person. Thus, while there may be some overlap between CNC and rebelliousness in the contrary nature of the behaviour, CNC is in response to more broad and general occurrences at work. Accordingly, we hypothesized that:

Hypothesis 3: There is a moderate, positive correlation between constructive non-compliance and trait rebelliousness.

Scale construction

An original pool of 47 items was created by two professors of organizational psychology at Erasmus University Rotterdam. These were given to five academic staff (of different seniority) from the same department of psychology, who were provided a description of CNC and asked to give each item a rating from 1 (not at all applicable) to 5 (entirely applicable), depending on how accurately the item fit with the definition of CNC. The original 47 were then reduced to the 21 items that received the highest score as representing the construct.

Procedure and participants

The questionnaire was completed online exclusively in Dutch, within a period of one week via Qualtrics. Participants were recruited by two master students and two bachelor students from Erasmus University Rotterdam. Participation requirements included speaking Dutch, working at least three days a week, and having coworkers and at least one manager. The volunteer sample of Dutch employees was recruited primarily through convenience sampling of personal connections of the students through Facebook, LinkedIn, word of mouth and via-via. Some were also recruited from a website called Part-up which gave one student access to a database of prospective participants. Student recruitment methods are commonly used in organizational psychology studies, with noted benefits to this technique such as a producing a heterogeneous sample, reducing costs, and the possibility for student learning (Demerouti & Rispens, 2014). Thus, this sampling method was considered acceptable for the present study.

A total of 223 participants completed the questionnaire. The sample comprised 61.4% females and 38.6% males. The average age was 40.18 years ($SD = 12.6$), with 37.2% having a vocational education, 25.6% having a university education, and the remaining 37.2% with a lower than an intermediate vocational education. On average, participants worked 33.79 ($SD = 7.98$) hours per week, and the average tenure was 9.82 years ($SD = 9.49$). The greatest percentage of participants worked in the healthcare and welfare sectors (26.9%), followed by industry (9.9%), trade (9.0%) and government (8.5%). The remaining 45.7% worked in a wide

range of sectors, including financial, communication, education, and transport. Only 28.3% had a supervisory or management position in their organization. Overall, 64.1% often came in contact with clients, 22.9% did occasionally, and 13.0% never did.

Measures

Constructive non-compliance was measured with the newly created items, which can be found in Table 1. Responses were given on a Likert scale from 1 (completely disagree) to 5 (completely agree). The alpha of the rule-deviation dimension was good (Cortina, 1993), $\alpha = 0.84$, and the other-deviation dimension was acceptable (Cortina, 1993), $\alpha = 0.74$.

Pro-social rule-breaking was measured with Dahling, Chau, Mayer and Gregory's (2012) General Pro-social Rule-breaking Scale (GPSRB). The GPSRB comprises 3 dimensions – coworker, efficiency, and customer aid. A sample item from this scale (efficiency) is “I violate organizational policies to save the company time and money.” Responses were given on a Likert scale from 1 (completely disagree) to 5 (completely agree). The alpha of all the subscales was excellent (Cortina, 1993), with the efficiency dimension alpha being $\alpha = 0.92$, the client dimension, $\alpha = 0.91$, and the other dimension, $\alpha = 0.90$.

Rebelliousness was measured with Cloninger, Przybeck and Svrakic's (1994) TCI-NS4. A sample item is “I cheat to get ahead.” The scale had responses from 1 (completely disagree) to 5 (completely agree). The alpha was acceptable (Cortina, 1993), $\alpha = 0.74$.

Results

Exploratory factor analysis

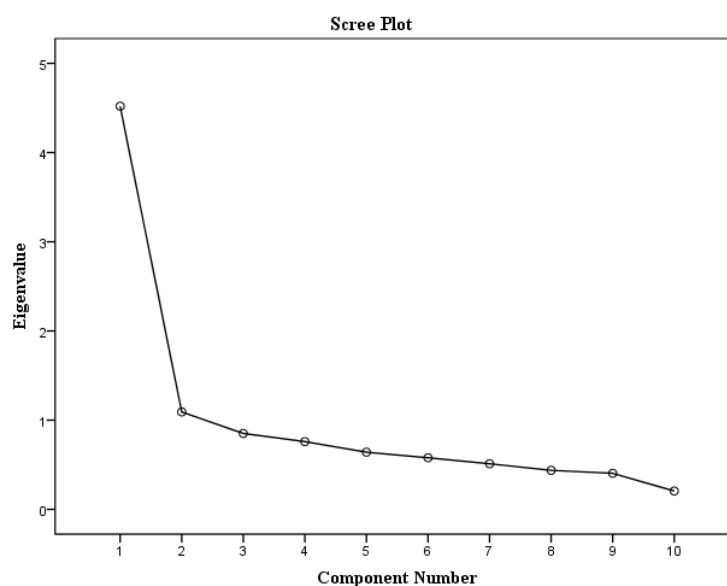


Figure 2. Scree plot produced by factor analysis

With the SPSS Varimax method, a principal axis factor analysis was conducted on the 23 items with oblique rotation (direct oblimin) to detect the two hypothesized factors, rule and other deviation. Sampling adequacy was verified by the Kaiser–Meyer–Olkin measure, $KMO = .88$, which according to Hutcheson and Sofroniou (1999) is “meritorious” (Field, 2013). An eigenvalue analysis was run which resulted in the first component (rule) with an eigenvalue of 4.52, or 45.20% of the variance, and the second (other) with 1.09, or 10.92% of the variance. These results indicated support for a two-factor model. Further, as shown in Figure 2, the scree plot also showed inflexions that justified two factors (Field, 2013).

While item number 6 (“My actions are more strongly guided by my ideas of what works best than by what my colleagues or manager say I should do”) loaded on both factors, we did not find this to be a problem for three reasons. First, manager instructions can be in themselves considered as rules for employees. Second, the two factors correlate highly with each other, so it is not illogical that one item might load onto both. Finally, additional analyses (available upon request) were conducted with AMOS which showed that a two factor solution fits the data better than a 1-factor solution. Thus, the first hypothesis was confirmed: factor one suggests a rule deviation subscale while factor two suggests a deviation from others subscale.

Table 1

Constructive non-compliance scale items, means, standard deviations, Cronbach's alphas and factor loadings

Item	<i>M</i>	<i>SD</i>	Factor	
			1	2
<i>Deviating from rules</i>				
1. I am not afraid to break rules if that means that I can conduct tasks better or faster.	3.33	1.02	.64	
2. When regulations are restricting me, I find a way around them.	2.86	1.10	.82	
3. To reach my personal work goals more efficiently, I do not fully comply with my supervisor's instructions.	2.78	1.01	.62	
4. When rules work against me, I find a way around them.	2.79	1.00	.88	
5. In order to do my job well, I sometimes deviate from existing rules.	2.61	0.87	.80	
<i>Deviating from others</i>				
6. My actions are more strongly guided by my ideas of what works best than by what my colleagues or manager say I should do.	2.91	0.91		.54
7. I make choices that I think are correct without paying much attention to what others think of it.	2.72	0.97		.70
8. I tend to hold on to what I truly believe is the right action, even if that implies conflict with others.	2.69	0.99		.71
9. I stick to my work goals even if that means letting others down at work.	2.70	0.91		.68
10. My tasks work out better when I perform them "in my own way."	3.21	0.87		.57

Notes: $N = 223$.

Discriminant validity

Table 2

Means, standard deviations, internal consistencies, and intercorrelations for the study variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Constructive non-compliance – rules	2.87	0.79	—				
2. Constructive non-compliance – others	2.85	0.65	0.62**	—			
3. PSRB – efficiency	2.50	0.80	0.76**	0.61**	—		
4. PSRB – coworker	2.55	0.78	0.54**	0.35**	0.68**	—	
5. PSRB – client	2.59	0.82	0.66**	0.45**	0.75**	0.73**	—
6. Rebelliousness	2.40	0.45	0.59**	0.38**	0.51**	0.53**	0.48**

Notes: $N = 223$; * $p \leq 0.05$, ** $p \leq 0.01$

The next step was to determine discriminant validity from other similar measures, namely pro-social rule breaking and rebelliousness. Subscale 1 (deviation from rules) had high correlations with the efficiency and client subscales, $r = 0.76$, $p < 0.01$, and $r = 0.66$, $p < 0.01$, respectively. There was a moderate correlation with the coworker subscale, $r = 0.54$, $p < 0.01$. On the other hand, subscale 2 (deviation from others) had a lower, moderate correlation with the efficiency subscale, $r = 0.61$, $p < 0.01$ as well as the client subscale, $r = 0.45$, $p < 0.01$. The lowest correlation was with the coworker subscale, $r = 0.35$, $p < 0.01$. In order to decide the appropriate cut-off value that would indicate discriminant validity between the constructs, we took precedent from Berry, Ones, and Sackett's (2007) research which examined the difference between interpersonal and organizational deviance to see if they were separable. The authors used an $r = 0.70$ cut-off value to determine discriminant validity. For this study we adopted this distinction, which is also appropriate considering the common subject of deviant behaviour. Thus, for the rule-deviation subscale, the correlation with two of the three PSRB subscales was over the cut-off, and for the third, the value was approaching the cut-off. However for the other-deviation subscale, all correlations were well below the cut-off. This indicated partial support for hypothesis 2.

For the third hypothesis, deviation from rules had a moderate correlation with rebelliousness, $r = 0.59$, $p < 0.01$. Deviation from others had the weakest correlation out of all with rebelliousness, $r = 0.38$, $p < 0.01$. These results confirm hypothesis 3, that CNC and rebelliousness are moderately positively correlated.

Study 2

The results of Study 1 validated the CNC measure, determined the two-factor structure, and showed that employees indeed demonstrate constructive non-compliant behaviour at work. In Study 2, we draw upon literature in deviance and creativity in order to explain why a direct relationship between CNC and creativity exists, and to demonstrate how CNC moderates the relationship between constraints and creativity, ultimately leading employees to be more creative at work.

Constructive non-compliance: The link with creativity

In itself, constructive non-compliance implies deviance from the norm or from rules. When employees engage in CNC behaviour they break norms to pursue their goals, thereby engaging in deviant behaviour. Mainemelis (2010) explains that deviance is a response which occurs when a social goal is important but structural strain exists, meaning that there are not legitimate ways to achieve this goal. In this case, the individual is forced to “violate the normative expectations of the social context” (Mainemelis, 2010, p. 561). Further, it has been suggested that “one must feel free to deviate from expectations, to question shared ways of viewing things, in order to evidence creativity” (Nemeth, 1997, p. 2), and a number of researchers acknowledge the notion that a link between creativity and deviance exists although it has received less attention (Baucus, Norton, Baucus, & Human, 2008; Gino & Ariely, 2012; Gino & Wiltermuth, 2014).

In fact, overemphasis on the status quo or an unwillingness to take risks and deviate from the standard can prevent creativity. To illustrate, Amabile (1988) quotes a scientist as saying, “often I will be tinkering in something that management will have no interest in, yet when I develop it there will be a lot of interest. If they had closed reins on me, they would have killed a lot of projects at an early stage” (p. 125). This type of behaviour is similar to Mainemelis’ (2010) creative deviance, when an employee pursues their ideas regardless of being told to stop. Had the doors of this scientist been closed by his superiors, the scientist would have been forced to re-open them in order to allow his creative ideas to flourish. In cases when employees are told to stop their pursuit of an idea, CNC behaviour can be triggered allowing employees to continue even if their actions are considered by definition “deviant.”

Recently, more attention has been given to the idea that “deviance” does not necessarily equate to “negativity” (Dahling, Chau, Mayer & Gregory, 2012; Morrison, 2006; Spreitzer & Sonenshein, 2004). Spreitzer and Sonenshein (2004) introduced the concept of positive

deviance as “intentional behaviours that depart from the norms of a referent group in honorable ways” (p. 828). This contrasts the majority of research on deviant behaviour, which labels it as inherently and entirely negative (Robinson & Bennett, 1995). For example, pro-social rule-breaking is deviance done with the end goal being to contribute or improve rather than to harm or with negative intent (Morrison, 2006). Spreitzer and Sonenshein (2004) suggest that there is a potential for positive deviance to be related to creativity and innovation on the basis that often creativity can be the result of a departure from norms. Mainemelis (2010) labels creative deviance as one behaviour which is neither inherently bad nor good, but can only be evaluated after the outcome is achieved. It can both lead to creativity that results in a viable or successful product, or can cost the organization resources or even pose a risk. Creative deviant behaviour, for example, would be an employee going against a direct order from a manager to stop working on a project. Mainemelis (2010) gives multiple cases where this occurred and led to products that were hugely successful, such as the film *The Godfather* and LED light technology. Another example comes from job crafting literature, where Wrzesniewski and Dutton (2001) describe a case of cooks that showed great creativity in their work despite being told to stop their actions, and also in the face of constraints:

In fact, the cooks worked as creatively as possible within strict managerial cost constraints. Cooks often tried new food combinations, creating novel dishes in order to meet job demands... in all of the examples, employees actively crafted the job, sometimes against management's wishes. ... the employees took initiative on their own. (p. 193)

Even when employees go against the grain and do not adhere to rules or norms, they can produce creative outcomes. In fact, there is less creativity in contexts where conformity is a value, and creativity is actually higher where there is some tolerance for deviance (Baucus, Norton, Baucus, & Human, 2008; Mainemelis, 2010). Thus, when there are goals to achieve but the employee is prevented from meeting these goals, it follows that one way to resolve this problem is by taking matters into one's own hands and not conform to rules or advice in an attempt to still be successful (Mainemelis, 2010). This is especially the case when there is more value ascribed to creativity or to achieving goals, rather than to adhering to the rules. Another example of this behaviour is again the concept of bootlegging, which has been shown to produce innovation in organizations even when there are bureaucratic obstacles in the way (Criscuolo, Salter & Ter Wal, 2014). Gino and Wiltermuth (2010) also demonstrate a link between dishonest behaviour, which could be considered deviant from social norms, and creativity. Their study that showed when individuals deviate from rules, they exhibit more

creativity because they do not feel constrained by the rules. Some explanations have been put forth describing how this link between creativity and deviance manifests. For example, in Lin's (2013) study examining the antecedents of creative deviance, she found that intrinsic motivation to pursue a rejected idea mediated the effect of autonomy on creative deviance. In a time-lagged study of 146 employees, Lin (2013) demonstrated that believing strongly in an idea increases the chance of its pursuit. This notion of motivation may also underlie the CNC behaviour, which intrinsically drives an individual to fulfill their work goals no matter what obstacles might be in the way. We hypothesize that on its own, CNC has a direct relationship with creativity:

Hypothesis 4: There is a positive relationship between constructive non-compliance and creativity.

Creativity and constraints

Constraints are situations or aspects of the work environment that prevent the realization of full performance because they hinder the employee from using their full ability or effort (Spector & Jex, 1998). Constraints can occur at both the organizational level (Spector & Jex, 1998) and also at the job level (Veldhoven & Meijman, 1994). Organizational level constraints are general factors in the organizational environment such as lack of equipment and supplies, supervisor problems, or inadequate training (Spector & Jex, 1998). Job level constraints, on the other hand, revolve around internal conflicts at work such as not enjoying tasks which are assigned, or external conflicts like having a disagreement with a colleague regarding a task (Veldhoven & Meijman, 1994). It has been suggested that when individuals are constrained, for example when they lack resources or autonomy, they are also hindered from being creative (Amabile et al., 1996; Spector & Jex, 1998).

But conflicting literature has shown that constraints and scarcity, rather than just freedom and abundance, can also lead to creative and innovative results (Cunha et al., 2014; Gibbert & Scranton, 2009; Hewitt-Dundas, 2006; Mainemelis, 2010; Rosenzweig & Grinstein, 2015). Gibbert and Scranton (2009) argue for this idea, and created a typology of the effects of constraints on innovation. They identified two constraints – rules and resources, and two ways in which the constraints operated – because of or despite the constraint. As the authors explain, necessity is the mother of innovation and constraints lead to the necessity of working around them (Gibbert & Scranton, 2009). Following the same thinking, Keup and Gassmann (2013) conducted a longitudinal survey study of Swiss companies to test whether knowledge and financial constraints would lead to radical innovations at the organizational level. When there are ample resources, there is less experimentation of new opportunities and more focus on

already-established processes. Situations of constraint can allow for knowledge to combine in new and novel ways, leading to creative solutions and innovations. Keup and Gassmann's (2013) results showed that knowledge and financial constraints both increased radical innovation.

Problematically though, the research in this domain has not explored which mechanism leads constraints to trigger creativity. Before these constraints can produce a creative outcome, they must first be actively transformed, changed or manipulated in some way, because there is a threshold beyond which constraints do not trigger creativity and can indeed have the opposite effect (Hoegl, Gibbert & Mazursky, 2008). Inherently, neither resource scarcity nor abundance on their own pose a disadvantage or advantage (Cunha et al., 2014). For example, abundance does not always lead to success and may even lead to over optimism or careless use of resources (Lindsley, 2005). In situations without constraints, a "path of least resistance" method is used to solve problems which takes the least cognitive effort (Moreau & Dahl, 2005). There is nothing to prevent the individual from utilizing a simple, straightforward, and uncreative solution to the problem. However, by engaging in CNC behaviours employees refuse to take the path of least resistance (which would be to comply with the rules or the advice of others in this case) because these would not lead to the best outcome for their work goals. Deviating from rules and from others is often not the simplest option in many organizations, and can lead to sanctions or reprimand for the non-complier (Mainemelis, 2010).

Thus, under situations of constraint where the path of least resistance is not taken, individuals become more creative as they employ more cognitive resources to link new ideas together (Mehta & Zhu, 2016). This notion is also supported by Baas et al.'s (2013) Dual Pathway to Creativity Model. They explain that creativity can come about in two ways – through persisting at a task long enough or through flexibly switching to a different approach or perspective to the problem. In this case, CNC is evoked by a flexibility response, which is an approach response that allows the individual to take the alternative solution from the path of least resistance. For example, a constraint situation could involve being restricted by available input materials, or being restricted by outcome requirements such as having to follow directions or conform to a set of standards. This elicits a constraint mindset in the individual, leading to "diminished functional fixedness" (Mehta & Zhu, 2015, p. 768). This means that the employee is able to think outside the box and behave beyond the prescribed norms or rules especially in situations of structural strain (Mainemelis, 2010). When constraints lead to re-framing of problems, rules, processes and thinking, CNC behaviours allow flexibility despite problems and thus stimulate creativity (Cunha et al., 2014). Furthermore, voicing expressions

of dissatisfaction have also been shown to trigger creativity (Zhou & George, 2001). However, it may be the case that not all employees choose to express their dissatisfaction verbally. Instead, through non-compliant behaviour, they can also persist regardless of the constraints in the work environment.

Considering the evidence above, there is reason to believe that constraints can indeed trigger creativity in the workplace. We use CNC to fill the gap in the literature about how exactly this relationship manifests. We propose that constructive non-compliance is a method that employees use to modify constraints in a way that helps them be more creative at work:

Hypothesis 5: In an environment where organizational constraints exist, constructive non-compliance moderates creative outcomes such that those high in CNC will be more creative.

Hypothesis 6: In an environment where job constraints exist, constructive non-compliance moderates creative outcomes such that those high in CNC will be more creative.

Procedure and participants

Data from Study 2 was collected at the same time as Study 1, for a period of three weeks in April 2016. One questionnaire was completed each week online in either Dutch or English through Qualtrics. Only the first week of the study included the constructive non-compliance, pro-social rule-breaking, and rebelliousness scales. Following the initial week for the validation, the questionnaires included additional measures, outlined below.

The same participants were used throughout Study 1 and 2 with the exception of participants who dropped out over time. In addition to the Dutch employees from Study 1, English speaking participants outside of the Netherlands also completed the study to increase external validity of results. Like the first Dutch sample, these English speaking employees were recruited through convenience sampling of personal connections, through Facebook, LinkedIn, word of mouth and via-via (Demerouti & Rispens, 2014). As before, participation requirements included working at least three days a week, and having coworkers and at least one manager.

A total of 170 participants completed the questionnaire. The sample comprised 63.5% females and 36.5% males, with 86.5% of the sample coming from the Netherlands and the remainder living in other countries such as Canada and Germany. The average age was 40.81 years ($SD = 12.94$). The average hours worked per week was 33.88 ($SD = 8.40$), and employees had worked at their respective organization for an average of 10.21 years ($SD = 9.88$). The greatest percentage of participants worked in the healthcare and welfare sectors (25.9%),

followed by trade and government (both 9.4%), industry (8.2%), and corporate (7.1%). The remaining 40% worked in a wide range of sectors, including financial, communication, education, and transport. Only 27.1% had a supervisory or management position. 64.1% often came in contact with clients, 27.1% did occasionally, and 8.8% never did.

Measures

Constructive non-compliance was measured with the newly created items from Study 1 (see Table 1). Responses were given on a Likert scale from 1 (completely disagree) to 5 (completely agree). The alpha of the deviating from rules dimension was good (Cortina, 1993), $\alpha = 0.85$, and the deviating from others dimension was acceptable (Cortina, 1993), $\alpha = 0.71$.

Organizational-level constraints. Spector and Jex's (1998) Organizational Constraints Scale (OCS) was used to measure this variable. The scale has 11 items, answered on a Likert scale from 1 (totally disagree) to 7 (totally agree). The wording of the items was modified to reflect the weekly level, by adding the phrase "During the previous week, I found it difficult or impossible to do my job because of..." followed by the items from the scale. Examples of the items include "poor equipment or supplies" and "incorrect instructions." The alpha of the scale was excellent (Cortina, 1993), $\alpha = 0.96$.

Job-level constraints. Job-level constraints were measured with 6 items from Veldhoven and Meijman's (1994) VBBA questionnaire. Like with the OCS, the wording of items was changed to reflect the weekly level. A sample item is "Last week I had conflict with my colleagues about the content of my tasks." Responses were given from 1 (totally disagree) to 7 (totally agree). The alpha of the scale was excellent (Cortina, 1993), $\alpha = 0.92$.

Weekly creativity. Creativity was measured each week with Tierney, Farmer and Graen's (1999) creativity scale, modified to reflect the weekly level. Answers were given on a Likert scale from 1 (completely disagree) to 7 (completely agree). A sample item from this scale is "Last week I demonstrated originality in my work." The alpha of the scale was excellent (Cortina, 1993), $\alpha = 0.96$.

Control variables. Due to the heterogeneity of work status in our sample, we controlled for hours of work which would determine whether the employee was full or part-time. It might be possible that part-time employees have less time at work and therefore less chance to be creative. We also controlled for nationality, in case there might be differences in creative expression depending on country of origin. Finally, we controlled for tenure, which has been shown to have an influence on innovative behaviour (Liu, Ge & Peng, 2016).

Analytical technique

The study design was a weekly diary study, which has demonstrated advantages and is used increasingly in organizational psychology research (Ohly, Sonnentag, Niessen & Zapf, 2010). Diary studies are one method to resolve the problem of cross-sectional studies, where fluctuating conditions and behaviours pose challenges to generalizing results (Ohly et al., 2010). In conducting diary studies, an important consideration is how long the interval should be between surveys. We used a one-week interval between samples because constraints on the job can vary from week to week depending on the work load and other situational factors in the organization (Totterdell, Wood, & Wall, 2006). Although it is true that daily fluctuations could be missed when collecting data at the weekly level, scores were aggregated over the three weeks, nonetheless giving a more reliable estimate than a simple cross-sectional study.

To test all hypotheses, multiple regressions analyses were used. For hypotheses 5 and 6, additional moderation analyses were conducted to determine if CNC modified the relationships between organizational constraints and creativity, as well as job constraints and creativity. A power analysis showed that the minimum number of participants for sufficient power was 159. Our sample of 170 exceeded this, making us confident that we had a large enough sample to detect the effects. Outliers were also checked, which showed that some Mahalanobis values were slightly higher than recommended. However, all Cook's values were below 1.00, indicating that removing cases was not necessary (Field, 2013). Multicollinearity diagnostics of the variables were assessed by examining VIF and tolerance values. All VIF values (between 1.03 and 2.20) and tolerance values (between .47 and .99) were within the acceptable range (Field, 2013), indicating that there was no multicollinearity between the variables which might affect the results of the multiple regression.

Results

Table 3

Means, standard deviations, internal consistencies, and intercorrelations for the study variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. Hours per week	33.88	8.40	—					
2. Tenure (years)	10.21	9.88	0.09	—				
3. Constructive non-compliance – rules	2.85	0.80	0.06	0.12	—			
4. Constructive non-compliance – other	2.90	0.64	0.00	0.04	0.60**	—		
5. Job constraints	2.86	1.02	0.03	-0.16*	0.10	0.07	—	
6. Organizational constraints	2.61	0.95	0.01	0.17*	0.08	0.17*	0.73**	—
7. Creativity	3.78	1.13	0.05	0.11	0.24**	0.29**	0.09	0.20**

Notes: $N = 170$; * $p < .05$, ** $p < .01$

To test hypothesis 4, that CNC and creativity were correlated, a stepwise multiple linear regression analysis was used. Basic descriptive statistics and regression coefficients are shown in Table 3. Notably, creativity was significantly correlated to all study variables except for job constraints, however even that had a positive correlation. Results partially supported hypothesis 4 and showed that CNC other, but not CNC rule, predicted creativity and accounted for 11% of the variance, $\Delta R^2 = .11$, $F(2, 164) = 8.25$, $p < .001$ (see Table 4 for detailed analysis).

Table 4

Regression analysis for the effects of CNC-rules and CNC-others on creativity

Variable	Step 1						Step 2					
	<i>b</i>	<i>SE</i>	β	<i>R</i>	<i>R</i> ²	ΔR^2	<i>b</i>	<i>SE</i>	β	<i>R</i>	<i>R</i> ²	ΔR^2
Constant	3.55**	.46		.12	.02		1.99**	.58		.32	.11**	.09**
Hours per week	.01	.01	.05				.01	.01	.04			
Nationality	-.07	.25	-.02				-.05	.25	-.02			
Tenure	.01	.01	.11				.01	.01	.09			
CNC – rule							.13	.13	.09			
CNC – other							.42**	.16	.24			

Notes: $N = 170$; ** $p \leq .01$

To test hypotheses 5 and 6, that constructive non-compliance moderates the relationship between organizational constraints and creativity as well as job constraints and creativity, a hierarchical multiple regression analysis was conducted. Because the CNC scale loaded on two factors, each factor was tested separately as a moderator. Altogether, 24.5% (adjusted r^2) of the variance in aggression was accounted for by these predictors. Although a significant model emerged ($F(3, 166) = 2.79$, $p < .01$) only CNC other ($\beta = 0.22$, $t = 2.30$, $p = .02$) and organizational constraints ($\beta = 0.29$, $t = 2.52$, $p = .01$) significantly contributed to the prediction of creativity (see Table 5 for detailed analysis). No interaction effects were significant. When entered separately in the regression, findings remained non-significant, indicating that the results were not method-dependent. Thus, both hypothesis 5 and 6 were rejected, as CNC did not moderate the relationship between organizational constraints and creativity.

Table 5

Moderated regression analysis for the effects of organizational constraints on creativity, moderated by CNC-rules and CNC-others

Variable	Step 1						Step 2					Step 3						
	<i>b</i>	<i>SE</i>	β	<i>R</i>	<i>R</i> ²	ΔR^2	<i>b</i>	<i>SE</i>	β	<i>R</i>	<i>R</i> ²	ΔR^2	<i>b</i>	<i>SE</i>	β	<i>R</i>	<i>R</i> ²	ΔR^2
Constant	3.55**	.46		.12	.02		3.63**	.44		.38**	.14**	.26	1.55	.44		.40**	.16**	.02
Hours per week	.01	.01	.04				.01	.01	.03				.01	.01	.06			
Tenure	.01	.01	.11				.01	.01	.12				.01	.01	.11			
Nationality	-.07	.25	-.02				-.13	.25	-.04				-.23	.26	-.07			
CNC – rule							.11	.10	.10				.10	.11	.08			
CNC – other							.22*	.10	.20				.25**	.11	.22			
Job constraints (JC)							-.12	.12	-.10				-.14	.13	-.12			
Organizational constraints (OC)							.29*	.12	.26				.33**	.13	.29			
CNC rules x JC													-.15	.15	-.15			
CNC rules x OC													.21	.14	.20			
CNC other x JC													-.05	.15	-.04			
CNC other x OC													-.01	.14	.20			

Notes: *N* = 170; * $p \leq .05$, ** $p \leq .01$

General Discussion

The present paper sought to further explore how constraints could lead to increased employee creativity at work. We fill gaps in past research which showed an inconsistent relationship between constraints and creativity. Some studies have demonstrated that constraints prevented creativity from occurring (Amabile, 1988; Larson & Gobeli, 1989; Spector & Jex, 1998), whereas other studies supported the notion that even when hindrances exist, creativity is still possible (Caniëls & Rietzschel, 2013; Cunha et al., 2014; Gibbert & Scranton, 2009; Mainemelis, 2010; Rosenzweig & Grinstein, 2015). With the present study, we empirically showed that the relationship between constraints and creativity is in fact positive. Further, by identifying constructive non-compliant behaviour we were able to explain one behavioural factor that determines how employees are able to still pursue their goals at work and be creative in the face of constraints.

We contribute to creativity, constraint, and positive deviance literature in a number of ways. First and foremost, the present study adds to growing evidence that non-compliant behaviour can lead to positive outcomes, in this case to creative output at work. The link between deviance and creativity has been presented mainly in a negative light, for example with individuals creatively breaking the law or engaging in dishonesty (Cropley & Cropley, 2011; Gino & Ariely, 2011; Gino & Wiltermuth, 2014). The present study showed that deviating from others was one trigger to creativity. Furthermore, both CNC and PSRB had positive relationships with creativity. These findings provide valuable evidence to support the notion that deviant behaviour can in fact lead to creative outcomes among employees. Second, to the best of our knowledge, this is the first longitudinal study which has attempted to explain how the link between constraints and creativity operates. By aggregating the questionnaires over three weeks, our results give a richer view on these relationships than would a one-time cross-sectional study. Because data is collected closer to the time events occurred each week, there is reduced retrospective bias which leads to greater accuracy in describing the situational context, providing a more generalizable snapshot of what occurs in the workplace overtime (Ohly, Sonnentag, Niessen & Zapf, 2010).

Additionally, although we made no specific prediction about this comparison, the present study is the first to contrast organizational and job-level constraints to demonstrate their unique contributions to creativity. It was found that organizational-level constraints contribute to the occurrence of employee creativity, while job-level constraints did not. This finding is somewhat counterintuitive because the creativity outcome at the individual level rather than at

the organizational one. However, it has been found that despite frustrations and constraints such as hierarchical decision making and bureaucracy, individuals still “know how to work the system, and that system is based largely on human connections” (O’Connor & McDermott, 2004). This could also explain why it was only the other-deviation subscale that predicted creativity, whereas the rule-deviation did not. As O’Connor and McDermott (2004) found, some employees thrive and are able to innovate despite rules, perhaps due to their ability to work effectively with organizational constraints like rules and limited resources. When it comes to the advice of others, they persist in their own way, allowing them to not take the path of least resistance towards a solution (Moreau & Dahl, 2010).

Although we hypothesized that pro-social rule-breaking and CNC were only somewhat similar to each other, our results indicated that in fact there was a rather strong similarity between the two. However, we do find this to be logical and acceptable for a few reasons. First, we offer a unique contribution to the field with the “deviation from others” scale, which as of yet does not exist in the literature. This subscale of CNC had better divergent validity from PSRB, showing that it taps into a different and previously unidentified behaviour. This is useful for researchers who wish to measure the degree of social and interpersonal norm-deviation in the workplace. Second, with our CNC scale we offer a more compact and shorter instrument to the literature than Dahling et al.’s (2010) General Pro-social Rule-breaking scale (GPSRB). Our CNC rule-deviation subscale is a quick alternative when the focus is to identify rule-breaking behaviours in only 5 items.

The presence of CNC did not strengthen the relationship between neither organizational constraints nor job constraints and creativity, thus not supporting our hypothesis that CNC is a moderator. We reasoned that CNC has its effect on constraints more through the flexibility approach, where an alternative solution to a problem is sought after (Baas et al., 2013). This is in contrast to the persistence approach which elicits creativity through increased time spent on a problem. A possible reason that CNC did not influence the relationship between constraints and creativity might be that on its own, CNC contributed more to creativity when compared to organizational constraints, and much more compared to job constraints which were not significant. This could indicate that CNC behaviour might matter more when it comes to being creative at work, rather than the types of constraints that an employee must face. Our findings indicate there is a greater need to clarify the relationship between deviant behaviour and creativity. Another possible explanation for why CNC did not moderate constraints could be because they do not occur together. Job constraints and both subscales of CNC did not have any relationship with each other, and organizational constraints had only a weak relationship

with the other-deviation subscale of CNC. This might mean that when constraints exist, there is not necessarily any rule-breaking type of behaviour, even though on their own both of them lead to creativity. These findings point toward the possibility that there may be in fact a different moderator that affects the relationship at play here.

Limitations

When considering the results, a few limitations should be taken into account. First is the use of a self-rated creativity measure. On average, individuals rated themselves as more creative rather than less. This self-evaluation could be prone to self-serving bias and may thus not be an accurate reflection of how creative employees really are at work. That being considered, the creativity scale was from 1 to 7 which indicates that individuals rated themselves only slightly above the average in terms of their creativity. However, the entire questionnaire was self-reported which may have led to inflated relationships. Particularly, it has been shown that self-reported creativity measures can lead to larger effect sizes than would otherwise be found (Ng & Feldman, 2012). At the same time, having used a longitudinal study was an advantage because this method can help to reduce the “consistency motif” bias that occurs when predictors and outputs are rated at the same time (Ng & Feldman, 2012). Future research can use more objective methods, such as supervisor or other-rated creativity, to measure these constructs.

Another limitation could be the high correlation between organizational and job constraints, which might have indicated multicollinearity. However, analyses which were conducted in fact showed no evidence of this. Furthermore, the two constructs predicted creativity differently in the case of rule and other CNC, which indicates that they are indeed distinct from each other. Despite this, future research could use a more fine-grained measure of both in order to form a more detailed impression of how both job and organizational constraints are differently related to creativity.

Implications and future directions

Having opened the door to little-explored areas of creativity, this study still leaves possibilities for future avenues of research. First, constructive non-compliance itself can be further understood. For example, what are its antecedents? Are some people more prone to CNC behaviour? Is it more prevalent in some work environments? Future research might take into consideration how tolerant or encouraging the organization is towards creativity and innovation, which may lead to structural strain when there are rules which prevent achieving goals (Mainemelis, 2010). By understanding these antecedents, it can give insight into who

might partake in CNC behaviours and what approach to take when dealing with employees that forego certain rules or norms. Knowing the antecedents for CNC behaviour could allow employers to take advantage of it by supporting employees when they feel constrained, especially in organizations where creativity and innovation is paramount to success. Second, defining the boundary between too many and too few constraints is an important pursuit. This can give organizations a more accurate indication of where they can safely lie on this spectrum in order to maximize their employees' creativity while still operating efficiently. Finally, we did not differentiate between situations where, for example, the employee has more or less autonomy. It might be that in some cases where organizational culture is more free or lenient in adhering to the rules, employees will not need to resort to CNC behaviours in order to follow through with their work goals and tasks. In future studies, it would be pertinent to control for how much freedom exists within the organization, to get a more accurate picture of how and when CNC behaviour comes into play.

The present research showed that creativity can be caused by triggers such as rule-breaking behaviour and constraints. This has implications for both well-established organizations, as well as start-up companies which are more likely to have limited resources and more constraints. First, to echo Mainemelis (2010), it may be a worthwhile practice to take into consideration more of the out-of-the-box ideas which would otherwise be shut down by management. While in some cases it may be a risk, allowing a greater number of these demonstrations of creativity to thrive longer could lead to huge potential benefits and gains for the organization. Furthermore, the role of leadership in helping creative ideas come to life is key. There is a delicate balance between allowing an employee to continue with a risky idea and stopping them from committing time and resources to it (Mainemelis, 2010). Leaders and supervisors should take into account when CNC behaviour might be going too far, compared to when they may be able to find a way to support the employee who may be on the brink of innovation (Škerlavaj, Černe & Dysvik, 2014).

Furthermore, it is true that rule breaking can bring up concerns about upholding ethical standards as well as the problem of not punishing employees who ignore rules, even though they have created a brilliant product or made a breakthrough. Managers can reward the end result but sanction the rule-breaking. This way, a balance is maintained between promoting a culture of creativity and innovation while reminding employees that there are rules in place to be upheld. Alternately though, constraints such as rules that need to be worked around in order for the employee to meet their work goals might warrant some scrutiny and consideration. It is possible that by identifying where CNC behaviours occur, rules which are consistently broken

or side-stepped because they are not optimal may be improved. This could potentially lead to better practices and policies for the entire organization. Finally, constraints such as lack of resources and funding, which can happen in any organization and especially in start-up companies, do not necessarily need to be feared or avoided. For example, at least some of the energy used to increase resources or gain investment funding can be redirected back to the tasks and goals at hand for employees and in product development. Managers can encourage employees to do more with less and to make use of what is presently available, rather than looking outwards for resources that might be challenging to acquire. The present paper has shown both theoretically and empirically that even in the face of constraints, creativity can continue to thrive and lead to innovative products. This new shift to harnessing the power of constraints is promising because “in a world of scarcity, ingenuity may be a crucial organizational skill” (Cunha et al., 2014, p. 34).

References

- Alves, J., Marques, M.J., Saur, I., & Marques, P. (2007). Creativity and innovation through multidisciplinary and multisectoral cooperation. *Creativity and Innovation Management, 16*(1), 27-34.
- Amabile, T.M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology, 45*(2), 357-376.
- Amabile, T.M. (1988). A model of creativity and innovation in organizations. *Research in Organizational Behavior, 10*, 123-167.
- Amabile, T.M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of Management Journal, 39*(5), 1154-1184.
- Amabile, T.M. (1998). How to kill creativity. *Harvard Business Review, September-October*, 78-87.
- Apter, M.J. (1982). The experience of motivation: the theory of psychological reversals. London & New York: Academic Press.
- Baas, M., Roskes, M., Sligte, D., Nijstad, B.A., & De Dreu, C.K. (2013). Personality and creativity: The dual pathway to creativity model and a research agenda. *Social and Personality Psychology Compass, 7*(10), 732-748.
- Baucus, M.S., Norton Jr, W.I., Baucus, D.A., & Human, S.E. (2008). Fostering creativity and innovation without encouraging unethical behavior. *Journal of Business Ethics, 81*(1), 97-115.
- Berry, C.M., Ones, D.S., & Sackett, P.R. (2007). Interpersonal deviance, organizational deviance, and their common correlates: A review and meta-analysis. *Journal of Applied Psychology, 92*(2), 410-424.
- Caniëls, M.C. & Rietzschel, E.F. (2013). A special issue of creativity and innovation management: Organizing creativity: Creativity and innovation under constraints. *Creativity and Innovation Management, 22*(1), 100-102.
- Cloninger, C.R., Przybeck, T.R. & Svrakic, D.M. (1994). *The Temperament and Character Inventory (TCI): A guide to its development and use*. St. Louis, MO: Center for Psychobiology of Personality, Washington University, 19-28.
- Cortina, J.M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*, 98-104.
- Criscuolo, P., Salter, A., & Ter Wal, A.L.J. (2014). Going underground: Bootlegging and innovative performance. *Organization Science, 25*(5), 1287-1305.

- Cropley, A. & Cropley, D. (2011). Creativity and lawbreaking. *Creativity Research Journal*, 23(4), 313-320.
- Cunha, M.P., Rego, A., Clegg, S., Neves, P., & Oliveira, P. (2014). Unpacking the concept of organizational ingenuity: learning from scarcity. *Handbook of Organizational and Entrepreneurial Ingenuity*, 34-56.
- Dahling, J.J., Chau, S.L., Mayer, D.M., & Gregory, J.B. (2012). Breaking rules for the right reasons? An investigation of pro-social rule breaking. *Journal of Organizational Behavior*, 33, 21-42.
- Demerouti, E. & Rispens, S. (2014). Improving the image of student-recruited samples: A commentary. *Journal of Occupational and Organizational Psychology*, 87(1), 34-41.
- Eve, R.A. (1978). A study of the efficacy and interactions of several theories for explaining rebelliousness among high school students. *The Journal of Criminal Law & Criminology*, 69(1), 115-125.
- Field, A. (2014). *Discovering statistics using IBM SPSS Statistics*. London: Sage.
- Gabe, T., Florida, R., & Mellander, C. (2012). The creative class and the crisis. *Cambridge Journal of Regions, Economy and Society*. doi: 10.1093/cjres/rss012.
- Gibbert, M. & Scranton, P. (2009). Constraints as sources of radical innovation? Insights from jet propulsion development. *Management & Organizational History*, 4(4), 385-399.
- Gino, F. & Ariely, D. (2011). The dark side of creativity: Original thinkers can be more dishonest. *Journal of Personal & Social Psychology* 102(3), 445-459.
- Gino, F. & Wiltermuth, S.S. (2014). Evil genius? How dishonesty can lead to greater creativity. *Psychological Science*, 25(4), 973-981.
- Glucksberg, S. (1964). Problem-solving: Response competition and the influence of drive. *Psychological Reports*, 75, 939-942.
- Griffin, M. & McDermott, M.R. (1998). Exploring a tripartite relationship between rebelliousness, openness to experience and creativity. *Social Behavior and Personality*, 26(4), 347-356.
- Guilford, J.P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.
- Hewitt-Dundas, N. (2006). Resource and capability constraints to innovation in small and large plants. *Small Business Economics*, 26, 257-277.
- Hoegl, M., Gibbert, M., & Mazursky, D. (2008). Financial constraints in innovation projects: When is less more? *Research Policy*, 37, 1382-1391.
- Hutcheson, G.D. & Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. London: Sage.

- Keupp, M.M. & Gassmann, O. (2013). Resource constraints as triggers of radical innovation: Longitudinal evidence from the manufacturing sector. *Research Policy*, 42(8), 1457-1468.
- Larson, E.W. & Gobeli, D.H. (1989). Significance of project management structure on development success. *IEEE Transactions on Engineering Management*, 36(2), 119-125.
- Lin, B. (2013). *Creative deviance: Its antecedents and outcomes in the workplace*. (Unpublished doctoral dissertation). The Chinese University of Hong Kong, Hong Kong.
- Liu, Z., Ge, L., & Peng, W. (2016). How organizational tenure affects innovative behaviour? The role of culture difference and status determinants. *National Business Review International*, 7(1), 99-126.
- Mainemelis, C. (2010). Stealing fire: Creative deviance in the evolution of new ideas. *The Academy of Management Review*, 35(4), 558-578.
- McDermott, M.R., & Barik, N. (2014). Developmental antecedents of proactive and reactive rebelliousness: The role of parenting style, childhood adversity, and attachment. *Journal of Motivation, Emotion, and Personality*, 2(1), 22-31.
- Mehta, R. & Zhu, M. (2015). Creating when you have less: The impact of resource scarcity on product use and creativity. *Journal of Consumer Research*, 42, 767-782.
- Moreau, C.P. & Dahl, D.W. (2005). Designing the solution: The impact of constraints on consumer's creativity. *Journal of Consumer Research*, 32(1), 13-22.
- Morgeson, F.P. & Humphrey, S.E. (2006). The work design questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology*, 91(6), 1321-1339.
- Morrison, E.W. (2006). Doing the job well: An investigation of pro-social rule breaking. *Journal of Management*, 32, 5-28.
- Nemeth, C.J. (1997). Managing innovation: When less is more. *California Management Review*, 40(1), 59-74.
- Ng, T.W.H. & Feldman, D.C. (2012). A comparison of self-ratings and non-self report measures of employee creativity. *Human Relations*, 65(8), 1021-1047.
- O'Connor, G.C. & McDermott, C.M. (2004). The human side of radical innovation. *Journal of Engineering and Technology Management*, 21, 11-30.
- Ohly, S., Sonnentag, S., Niessen, C., & Zapf, D. (2010). Diary studies in organizational research. *Journal of Personnel Psychology*, 9(2), 79-93.

- Pasikowski, D.S. (2013). Readiness to resist and its relationship with creativity. *Psychological and Pedagogical Aspects of Motivation*, 52, 71.
- Rank, J., Pace, V.L., & Frese, M. (2004). Three avenues for future research on creativity, innovation, and initiative. *Applied Psychology*, 53(4), 518-528.
- Reis, H.T. & Judd, C.M. (2000). *Handbook of research methods in social and personality psychology*. New York: Cambridge University Press.
- Robinson, S.L. & Bennett, R.J. (1995). A typology of deviant workplace behaviours: A multidimensional scaling study. *The Academy of Management Journal*, 38(2), 555-572.
- Rosenzweig, S. & Grinstein, A. (2015). How resource challenges can improve firm innovation performance: Identifying coping strategies. *Creativity and Innovation Management*, 1-19.
- Škerlavaj M., Černe M., & Dysvik, A. (2014). I get by with a little help from my supervisor: Creative-idea generation, idea implementation, and perceived supervisor support. *Leadership Quarterly*, 25(5), 987-1000. doi: 10.1016/j.leaqua.2014.05.003
- Spector, P.E., Dwyer, D.J., & Jex, S.M. (1988). Relation of job stressors to affective, health, and performance outcomes: A comparison of multiple data sources. *Journal of Applied Psychology*, 73(1), 11-19.
- Spector, P.E. & Jex, S.M. (1998). Development of four self-report measures of job stressors and strain: Interpersonal conflict at work scale, organizational constraints scale, quantitative workload inventory, and physical symptoms inventory. *Journal of Occupational Health Psychology*, 3(4), 356-367.
- Spreitzer, G.M. & Sonenshein, S. (2004). Toward the construct definition of positive deviance. *American Behavioural Scientist*, 47(6), 828-847.
- Sternberg, R.J. & Lubart, T.I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York: Free Press.
- Tierney, P., Farmer, S.M., & Graen, G.B. (1999). An examination of leadership and employee creativity: The relevance of traits and relationships. *Personnel Psychology*, 52(3), 591-620.
- Totterdell, P., Wood, S., & Wall, T. (2006). An intra-individual test of the demands-control model: A weekly diary study of psychological strain in portfolio workers. *Journal of Occupational and Organizational Psychology*, 79(1), 63-84.
- Veldhoven, M.J.P.M. & Meijman, T.F. (1994). *Het meten van psychosociale arbeidsbelasting met een vragenlijst: de vragenlijst beleving en beoordeling van de arbeid (VBBA)*. Nederlands Instituut voor Arbeidsomstandigheden NIA.

- Wolfradt, U. & Pretz, J.E. (2001). Individual differences in creativity: Personality, story writing, and hobbies. *European Journal of Personality*, 15(4), 297-310.
- Woodman, R.W. & Schoenfeldt, L.F. (1989). Individual differences in creativity. In *Handbook of Creativity*, 77-91. New York: Springer US.
- Wrzesniewski, A. & Dutton, J.E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *Academy of Management Review*, 26(2), 179-201.
- Zampetakis, L.A. (2010). Unfolding the measurement of the creative personality. *The Journal of Creative Behavior*, 44(2), 105-123.