Faculteit Bedrijfswetenschappen en Economie
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Does repeated change paradoxically undermine organizational adaptability? Essays on the impact of repeated organizational change on public organizations' capacity to adapt.

Ondermijnen herhaalde veranderingen paradoxaal het aanpassingsvermogen van organisaties? Essays over de impact van herhaalde organisatieverandering op het aanpassingsvermogen van publieke organisaties.

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English abstract

Climate change, globalized terrorism, disruptive technologies, and the COVID-19 pandemic have presented governments with unprecedented, fast-evolving challenges requiring rapid response and adaptation. Consequently, public organizations have been implementing changes at an increasing pace as they attempt to keep up. At the same time, civil servants must develop new skills centered on adaptability and flexibility. However, evidence from the field suggests that civil servants find it increasingly difficult to cope with a highly turbulent work environment in which change is nearly constant. Many are feeling overwhelmed by too many organizational changes occurring in a row. While public organizations often implement changes in pursuit of more adaptability, the question thus arises whether repeated change paradoxically undermines their capacity to adapt. This dissertation seeks to answer this question by examining the effects of repeated change – as it is perceived by civil servants- on their levels of role clarity, autonomy, and proactive behavior at work. In doing so, this research examines whether there is evidence of a threat-rigidity response in civil servants, characterized by a constriction of control and restriction in information processing.

Results show that the more changes civil servants experienced, the less clear they were about their role at work, the less individual autonomy they experienced, and the less proactively they behaved at work. These results offer empirical support for the cognitive and behavioral inflexibility characteristic of a threat-rigidity response. Finding that repeated change causes civil servants to respond with rigidity rather than the required flexibility; this dissertation concludes that repeated change paradoxically undermines public organizations' capacity to adapt. In addition, the finding that chronic stress in civil servants distorts their perceptions of the frequency of change offers important implications for public sector change management. It indicates that change management strategies based on objective accounts of change may be tailored to a reality that does not align with the reality of change as civil servants experience it.

Nederlands abstract

Klimaatverandering, geglobaliseerd terrorisme, disruptieve technologieën, en de COVID-19 pandemie, hebben overheden geconfronteerd met ongekende, snel evoluerende uitdagingen die een groot aanpassingsvermogen vereisen. Als gevolg daarvan hebben publieke organisaties in een steeds hoger tempo veranderingen doorgevoerd in hun pogingen om bij te blijven. Tegelijkertijd moeten ambtenaren nieuwe vaardigheden ontwikkelen waarin aanpassingsvermogen en flexibiliteit centraal staan. Uit de praktijk blijkt echter dat ambtenaren het steeds moeilijker vinden om om te gaan met een turbulente werkomgeving die continue verandert. Velen voelen zich dan ook overweldigd door de niet aflatende stroom aan veranderingen. Dus terwijl publieke organisaties vaak veranderingen doorvoeren in hun streven naar meer aanpassingsvermogen, rijst de vraag of herhaalde veranderingen paradoxaal genoeg dit aanpassingsvermogen ondermijnen. Dit proefschrift tracht deze vraag te beantwoorden door de effecten te onderzoeken van herhaalde verandering - zoals die wordt ervaren door ambtenaren - op hun niveaus van rolduidelijkheid, autonomie en proactief gedrag op het werk. Daarbij wordt onderzocht of er sprake is van een 'treat-rigidity' respons die wordt gekenmerkt door een constrictie van controle en beperkte informatieverwerking.

De resultaten tonen aan dat hoe meer veranderingen ambtenaren meemaakten, hoe minder duidelijk ze waren over hun rol op het werk, hoe minder individuele autonomie ze ervaarden en hoe minder proactief ze zich gedroegen op het werk. Dit biedt empirische ondersteuning voor de cognitieve en gedragsmatige inflexibiliteit die kenmerkend is voor een threat-rigidity respons. Dit proefschrift concludeert daarom dat herhaalde verandering het vermogen van publieke organisaties om zich aan te passen paradoxaal ondermijnt. Daarnaast biedt de bevinding dat chronische stress bij ambtenaren hun perceptie van de frequentie van verandering vertekent belangrijke implicaties voor verandermanagement in de publieke sector. Het geeft aan dat strategieën voor verandermanagement gebaseerd op objectieve metingen van verandering mogelijk niet overeenstemmen met de realiteit van verandering zoals ambtenaren die ervaren.

Voorwoord

Dit doctoraat zou er niet gelegen hebben zonder de bijdrage van verschillende mensen. Allereerst wil ik mijn promotoren, Jan Wynen, Koen Verhoest, en Bjorn Kleizen bedanken voor hun steun en advies doorheen dit traject. Jullie hebben elk op jullie eigen manier bijgedragen aan het succes van dit doctoraat. Jan, jouw methodologische expertise, vasthoudendheid en creativiteit in het bedenken van onderzoeksvragen waren een drijvende kracht achter de publicaties die er nu reeds liggen. Bjorn, jouw brede theoretische kennis en probleemoplossend vermogen hebben mij enorm geholpen tijdens het schrijven van papers en deze thesis. Koen, jouw strategisch inzicht en vermogen om een brug tussen onderzoek en praktijk te slaan zijn inspirerend en waren cruciaal doorheen de dataverzameling van dit onderzoek. Mijn dank gaat ook uit naar elk van mijn juryleden. Per Laegreid, voor het delen van zijn jarenlange expertise in publieke administratie, en voor het verzekeren dat de publieke sector context van dit onderzoek tot zijn recht kwam. Zuzanah Murdoch en Bram Verschuere wil ik bedanken voor hun kritische vragen in de laatste fase van mijn traject. Deze hebben me geholpen in het vinden van een juiste balans tussen algemene managementaspecten en administratieve factoren en implicaties. Tot slot ook een woord van dank aan Johanna Vanderstraeten, als voorzitster van de doctoraatscommissie zorgden jouw organisatorische en tijdmanagementvaardigheden ervoor dat ik het meeste kon halen uit de jaarlijkse evaluaties.

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Introduction: Organizational change – a story of no gain without pain?

The rise of public sector turbulence.

Public sector work environments are known to be inherently complex and dynamic, characterized by checks and balances, shared power, diverging interests and the primacy of politics (Boyne, 2002). Like private organizations, they deal with a multitude of stakeholders including clients, partners, suppliers and even competitors (van der Voet et al., 2015). In addition, public organizations must deal with political superiors and regularly face diverse external political influences on their decision-making processes. As a result, public managers are often tasked with pursuing multiple -not seldomly conflicting- goals, imposed on them by numerous stakeholders (Boyne, 2002). Add to that the great public and political scrutiny they face, and it seems fair to say that public sector work settings are challenging at the best of times (cf. Rainey, 2014).

The multiplicity of external actors and demands means the public sector has always dealt with episodes of turbulence, defined as "situations where events, demands, and support interact and change in highly variable, inconsistent, unexpected or unpredictable ways" (Ansell & Trondal, 2018, p.43). However, over the past decade, turbulence has risen to the point where it can be now considered a chronic and endemic condition for modern governments (Ansell, Sørensen, & Torfing, 2022). Climate change, globalized terrorism, disruptive technologies, down to the Covid-19 pandemic have presented governments with unprecedented, fast-evolving challenges, requiring rapid response and adaptation (Ansell et al., 2023; Cirstofoli et al. 2022). Consequently, public organizations have been implementing changes at increasing pace as they attempt to keep up (Wynen, Verhoest & Kleizen, 2019). Moreover, as they respond to rising turbulence in their environment, public organizations also face increasing internal turmoil as mandated change efforts coincide with self-initiated change initiatives, further adding to workplace turbulence experienced by civil servants (Ansell & Trondal, 2018).

While the concept of turbulence naturally implies a need to respond, adapt and change, it refers to a certain kind of adaptation and requires a certain kind of change (Ansell et al., 2023). As Anssel et al. (2023) explain:

> *"When change is slow and steady, when shifts and trends can be clearly anticipated, and when important parameters change in observable, understandable, and relatively discrete ways, we are not in a turbulent world. When we have the leisure to respond to change through planned adaptation, when we seek to optimize structures or processes through comprehensive system*

reforms, or when we tweak operations to adapt to expected variance in resources, supplies, or personnel, we are generally not in a world of turbulence; instead, turbulence describes a state in which change is sudden, surprising and difficult to understand or track. It describes a world where we must deal with multiple, simultaneous changes, each demanding our immediate attention, often creating contradictions and dilemmas. Adaptation to turbulence can be like a group of strangers rapidly assembling a puzzle, where the picture is blurry and the pieces fit together poorly." (pp. 3-4)

These insights help us understand not only the increasing frequency of public sector changes, but also the erratic and uncoordinated manner in which they seemingly occur. While such rapid and intense organizational change poses significant challenges for public organizations at various levels, this research focuses on the implications for those who are tasked with implementing these changes – civil servants. Since an organization can only be as adaptable as its individuals (Shin et al. 2012), it is only by understanding how repeated change impacts civil servants at the individual level that we can begin to understand how this affects the overall adaptability of public organizations (cf. Lengnick-Hall et al. 2011).

Evidence from the field suggests that civil servants find it increasingly difficult to cope with a highly turbulent work environment, in which change is nearly constant (de Vries & de Vries, 2023). Many have started feeling apathetic towards or overwhelmed by too many organizational changes occurring in a row (NOS, 2016; Spicer, 2018). This phenomenon -labeled 'change fatigue' (cf. Bernerth et al., 2011)- seems to have become pervasive throughout government organizations globally. A recent report on the organizational culture in the Dutch Tax Administration, for instance, revealed that civil servants "are reorganization fatigued by now" (Deloitte, 2020, p.39):

"Self-reflection and ability to change are asked for, however, employees indicate that they are tired of change." (Deloitte, 2020, p.4)

Similar observations have been made in the UK and Irish civil service:

"Civil servants from the [Irish] Department of Public Expenditure and Reform have warned about the potential for "reform fatigue" within the public sector following years of responding to crises." (McNally, 2023)

"It is not surprising that many working in the NHS have contracted a bit of change fatigue and weariness from political interference, especially when they don't understand the need for some things to be changed." (Spicer, 2018)

Being asked to adapt to new systems, procedures, and policies constantly, it is easy to see how civil servants may become overwhelmed, especially when the details of changes are unclear or poorly communicated (Yoon, 2019). Moreover, as the intensity of change increases, civil servants are left with less time to recover. Such a lack of periods with relative stability can lead to mounting levels of stress in civil servants and increase the risk of change producing unintended side-effects (Seo & Hill, 2005; Smollan, 2015). Hence, while organizations often implement changes in pursuit of more adaptability, the question arises whether constant change paradoxically undermines public organization's capacity to adapt. It is also the main question this thesis seeks to answer. In the next section, we first take a closer look at the side-effects of intense change that have been identified by research so far, and identify which insights remain missing.

Side effects of repeated change: what is known and what is left to uncover.

According to Abrahamson (2004), change fatigue is but one of the symptoms associated with excessive organizational change. He explains change fatigue originates from an overload of change initiatives, noting that many change programs -once started- are not completed but dropped midway in favor of a new, supposedly 'superb', initiative. While his insights stem from general management research, we see highly similar situations in public organizations, where public managers may find themselves forced to abandon one change program in favor of another initiative inspired by new political priorities. Abrahamson argues such initiative overload inevitably leads to chaos, "a state of upheaval resulting from a multitude of change initiatives washing through the organization, making people lose track of which change they are implementing or why" (Abrahamson, 2004, p.94). This chaos will not only make it difficult for civil servants to find out what procedures to follow and who is responsibility for what, it may also cause them to become cynical of change overall (cf. Abrahamson, 2004). Change initiative overload, chaos, and change cynicism are all considered symptoms of what Abrahamson calls 'repetitive change syndrome'. As organizational change intensifies, for prolonged periods of time, the more time will be needed to recover from these change-inflicted symptoms (Abrahamson, 2004).

Abrahamson's findings on the consequences of increasingly intense change in private sector settings called for a closer examination of its applicability in public sector organizations. Accordingly, an emerging body of research has started to examine the potential compounding effects of organizational changes in

public sector settings. Several studies in public administration and public management have already been able to link repeated reforms to a range of negative outcomes, such as higher absenteeism rates, increased turnover intentions, more presenteeism, and reduced innovation capacity (Wynen et al., 2017; 2020; 2022). These findings indicate Abrahamson's notion of repetitive change syndrome also applies to public organizations, with scholars as well as practitioners embracing the term (e.g., Spicer, 2018, Carter, 2013, Wynen et al., 2019). While studies thus far revealed various unintended side effects of repeated change in government organizations, it remains unclear what precisely causes these effects. Scholars have suggested a so-called rigidity response may lie at the root of these findings (Wynen et al., 2017; 2019; 2020; 2022). Their assumption is based on the thesis that, under threatening conditions, employees and their organizations tend to restrict information processing and constrict control to a limited number of actors ('t Hart et al., 1993; Staw, Sandelands & Dutton, 1981). This thesis lies at the core of threat-rigidity theory, which predicts that exposure to a threat will lead to so-called 'threat-rigidity' effects in individual employees, which carry over to the team and organizational level. As employees fall back on fixed patterns of thought and action and become less receptive to input from their environment, rigidity is said to ensue. A rigidity response is not necessarily maladaptive and may be functional in certain (predictable) situations (Staw et al., 1981). However, the negative outcomes identified in prior studies on repeated public sector change suggest it leads to maladaptive rather than adaptive outcomes for public organizations. At the same time, there also exists a 'crisis flexibility' theory, predicting the exact opposite will occur. It posits that the threat of organizational change – considered as a type of 'willful' crisis- will make managers more receptive to the input from other organizational members and lower-level employees as they attempt to deal with increased uncertainty (Barnett & Pratt, 2000).

Extant research indicates that a constantly changing work environment may indeed pose a substantial level of threat (Kiefer, 2015; Giaever & Smollan, 2015; Bernerth et al., 2011). Yet, robust empirical evidence of repeated change causing either a rigidity or a flexibility response in civil servants, as described above, is still lacking. Finally, further reflection is needed on how change-induced rigidity or flexibility may affect contemporary public organizations' capacity to adapt.

Key research questions

In light of the increasingly turbulent operating context and growing pace of change confronting the public sector, this PhD examines

"how repeated organizational change affects the ultimate adaptability of public organizations."

It builds on previous research that has suggested frequent organizational change may trigger a rigidity response, characterized by a constriction of control and restricted information processing (cf. threat-rigidity theory from Staw, Sandelands & Dutton, 1981). However, this theoretical assumption still lacks substantial empirical support (Kleizen, 2019; Wynen et al. 2019; 2020). In a first phase of the PhD, I therefore examine whether continuous change causes civil servants and their organizations to respond with rigidity. To assess whether rigidity occurs, a number of sub-research questions are developed and addressed in the first three articles of this dissertation. These articles investigate the effect of repeated change on civil servants' level of role clarity, their proactive behavior, and the degree of centralized decision-making. Each of these research questions are formulated to test for key cognitive and behavioral aspects of a threat-rigidity response.

Article 1 examines the impact of repeated change on civil servants' role clarity as a key indicator of threat-rigidity. Reduced role clarity will be indicative of a restriction in information processing at the individual level. As described by threat-rigidity theory, employees will become more withdrawn and hold on to familiar beliefs and knowledge. This implies they will be less likely to seek clarification on roles that evolve quickly in organizations undergoing constant change, since new role information is likely to conflict with employees' existing understanding of their role. This will cause role ambiguities to linger on. At the organizational level, reduced role clarity would point at a constriction of control: When fewer employees can participate in decision-making it becomes more difficult to clarify role expectations.

Article 2 examines the impact of repeated organizational change on the degree of centralized decision-making, which is operationalized through perceived autonomy at the individual and the team-level. Two alternative hypotheses are tested based on two competing theories: one predicting increased centralization in line with threat-rigidity theory (Staw et al., 1981), the other predicting decreased centralization based on crisis flexibility theory (Barnett & Pratt, 2000). By examining whether civil servants who experienced frequent changes report fewer individual and team-autonomy, I verify whether there is an increased centralization of decision authorities (i.e. constriction of control) as predicted by threat-rigidity theory. The operationalization through individual and team-level autonomy allows to test for threat-rigidity effects at various levels.

Article 3 examines the impact of civil servants' past change experiences on their proactive behavior at work. Using Conservation of Resources (COR) theory (Hobfoll, 1989), it is argued that civil servants with a history of frequent change will behave less proactive when confronted with new changes compared to those who only experienced little change in the past. This is based on the assumption that individuals who already experienced many changes will favor more defensive behavioral strategies that require less effort

and involve less risk. By examining if repeated change causes civil servants to fall back on fixed behavioral patterns (constriction of control) and beliefs about their work environment (restricted information processing), we test for individual-level threat-rigidity effects.

By examining if perceptions of repeated organizational change have an impact on the level of role clarity civil servants experience, their perceived decision latitude, and their level of proactivity at work, I asses if rigidity occurs across the individual, team, and organizational level.

Furthermore, this research is characterized by a strong focus on the micro-level. Part of this approach entails zooming in on civil servants' perceived exposure to change rather than working with 'objective' measurements of change (e.g. obtained from a database or archives). This focus on perceptions seems warranted since previous research already indicated that employees who (objectively) experienced the same change events may nevertheless have different perceptions on the overall occurrence of change (Loretto et al., 2010; Rafferty & Griffin, 2006; Rafferty & Jimmieson, 2017).

In **Article 4**, I therefore examine to what extent perceptions of change frequency may vary in civil servants. Specifically, this article explores if chronic stress causes civil servants to perceive more change. This is based on research from cognitive psychology and neuroscience which found that stress often leads to a distorted view of reality and causes exacerbated perceptions of threat (Bar-tal et al. 2013, Epel et al., 2018, Vernooij et al., 2022). As such, this article challenges threat-rigidity theory which frames stress a result of perceived threat. It urges us to consider that repeated change may not pose the same level of threat to every civil servant and highlights the role of chronic stress in civil servant's threat appraisals of organizational change. This final article thus provides a critical reflection on the application of threat-rigidity theory for predicting individual employee responses to repeated organizational change.

Table 1 provides an overview of the different research questions and the articles in which they are addressed. It also outlines the hypotheses and relationships studied, as well as the data sources and methodologies used.

Table 1. Article outline

Research question	Article	Data source	Relationship	Hypothesis	Method
Does repeated change impact role clarity of civil servants?	1	APS (2014)	Change complexity -> role clarity	Employees who experienced more diverse types of change in a short timeframe will report lower levels of role clarity.	Propensity score matching and OLS regression
Does repeated change impact the degree of centralized decision-making?	2	Belgian agency (wave 1)	Change intensity -> centralization of decision-making	Increasing change intensity will lead to lower levels of perceived centralization of decision-making.	OLS regression
Does repeated change impact civil servant proactivity?	3	Belgian (wave 1 + 2)	Past changes experienced -> proactivity	Employees who experienced many changes in the past will be less proactive in response to new changes compared to their colleagues who experienced few changes in the past.	First-difference analysis
Does chronic stress impact civil servant perceptions of change frequency?	4	Flemish municipalities (3 waves)	Chronic stress -> change frequency	Higher levels of chronic stress in civil servants are positively associated with an increased perceived number of organizational changes.	Poisson fixed effects model

Next, the theoretical framework introduces the main theories that are used throughout the four articles of this PhD.

Theoretical framework

Organizational psychologists and management scholars have developed a wealth of models and theories to explain individual and organizational-level effects of organizational change (oreg et al., 2011). Many of these center on the concept of stress, predicting under what conditions stress is most likely to occur, and what the subsequent effects will be on employee behaviors and coping styles. Seminal models include Lazarus & Folkman's transactional model of stress and coping (e.g. Lazarus & Folkman, 1984) and Hobfoll's Conservation of Resources theory (Hobfoll, 1989). Both theories share the notion that perceptions of threat will cause a stress response in individuals. Whereas Hobfoll proposes that stress stems from the actual or anticipated loss of resources, Lazarus and Folkman propose it emerges from individuals' appraisal of a situation as potentially harmful to them personally. The experienced distress in turn will trigger a range of coping behaviors in individuals as they attempt to deal with the stressful situation (cf. Lazarus & Folkman, 1984; Hobfoll, 1989). Lazarus and Folkman distinguish between emotion-focused vs. problem focused coping styles. Whether an individual reverts to one or the other will largely depend on their assessment of the resources they have available. Hobfoll offers no specific classification but argues employee coping response will either be targeted at acquiring more resources or preventing (further) resource loss. The latter will entail more defensive, passive coping behaviors than the former. Threat-rigidity theory shares similar theoretical underpinnings, as it also links perceived threat to subsequent (emotional and physical) stress responses. However, it distinguishes itself from the former theories by predicting stress induced effects not only at the individual level, but also on a team- and organizational level. Consequently, threat-rigidity theory has been favored in several public management studies aimed at predicting organizational level effects of repeated reforms, such as the impact on organizational cultures and the degree of autonomy public organizations possess (Kleizen, 2019).

The observation that most studies revert to stress theories to explain how individuals cope with organizational change, points at a universal assumption that change is inextricably linked with the experience of stress (e.g., Smollan, 2015). While each of the theories mentioned above conceptualize stress somewhat differently, they each consider threat to be a key antecedent to employee stress. Hence, before taking a closer look at each of these theories, we first explore how organizational change, particularly repeated change, relates to the notion of 'threat'.

Change, uncertainty, and threat

The increasing pace of change in public organizations has created considerable challenges for civil servants tasked with implementing these changes (Brunsson, 2009; Wynen, Verhoest & Kleizen, 2019). Both scholars and practitioners have raised concerns about the pervasiveness of change fatigue - an inability to cope with continuous change and its implications - in many government organizations (de Vries & de Vries, 2021; McNally, 2023). When change is nearly constant and there is little time to recover, organizational change can become particularly stressful (Seo & Hill, 2005; Smollan, 2015). Being asked to adapt to new systems, procedures, and policies constantly, may lead civil servants to become overwhelmed, especially when the details of changes are unclear or poorly communicated (Yoon, 2019). Accordingly, one of the primary sources of stress for civil servants in the face of organizational changes is the uncertainty associated with these changes (e.g., Bordia et al., 2004; Johnson, 2006; Smollan, 2015). Uncertainty is defined as 'an individual's perceived inability to predict something accurately' (Milliken, 1987, p. 136). It can usually be attributed to ambiguous or contradictory information, or a simple lack of information (cf. Allen et al., 2007). Bordia et al. (2004) distinguish between three different but interrelated types of uncertainty that employees can encounter during organizational change: strategic, structural, and job-related uncertainty.

Strategic uncertainty refers to uncertainty regarding organization-level issues, such as the reasons for change, how it will impact the future direction of the organization, and its viability (Bordia et al., 2004). Policy changes, for instance, may create uncertainty among public service personnel regarding the organization's strategic direction (e.g., privatization, funding cuts) (Desveaux, 1994). Strategic uncertainty often reflects a lack of clear vision or strategic direction by the leaders of change, leaving staff feeling uncertain regarding the reasons for change or the overall nature of the change (Kotter, 1996). **Structural uncertainty** arises from changes to the organization's inner workings, such as reporting structures and functions of different work-units (Bordia et al., 2004). Organizational restructuring often involves the merging of work units, the disbanding of certain departments, and team-based restructuring, creating uncertainty regarding the chain of command, the relative contribution of work units, and policies and practices (Buono & Bowditch, 1989). Finally, **job-related uncertainty** refers to the uncertainties employees may have regarding various aspects of their job, such as job security, promotion opportunities, and changes to the job role. Job-related uncertainties are widely prevalent in changing organizations and have been extensively noted in the literature (Amarantou et al., 2018; Ruppel et al., 2022; Bordia et al., 2004).

Civil servants are likely to face a host of job-related uncertainties as their organizations change. Structural reforms, for instance, often produce considerable uncertainty for civil servants as they wonder whether and how a restructuring will affect them and their position within the organization (Pollitt, 2007; Rafferty & Griffin, 2006). Furthermore, organizational changes are often accompanied with changing roles and new responsibilities, contributing to confusion and stress among employees (Jimmieson, Terry, & Callan, 2004). In civil servants, this may even lead to policy alienation; a situation in which they begin to feel disassociated from policy implementation processes and goals due to a lack of clarity on the type of responsibilities and tasks they are expected to execute (Tummers, Bekkers, & Steijn; 2009). Furthermore, new performance expectations and metrics are often introduced to support change initiatives, which can be unclear and lead to uncertainty among civil servants about how to meet these (Buick et al., 2015). Organizational change can also impact the organization's culture, leading civil servants to feel unsure about what values and behaviors will be valued in the changed organization and whether these will still align with their personal values (Schweiger & Denisi, 1991; Braams et al., 2023). Bordia et al. (2004) found that these job-related uncertainties have the most profound impact on employees' ability to deal with organizational change (Bordia et al., 2004). This may be explained by the fact that such job-related issues will have the greatest impact on employees at the work unit level (Klein, 1996).

In sum, organizational change often confronts civil servants with various forms of uncertainty at different levels (strategic, structural, job-related). This is crucial to understand why change can be threatening to employees since uncertainty makes up a key aspect of threat, which is generally defined as "the *potential* for harm" (Pagana, 1988, p.418). As such, threat concerns losses that have not taken place yet but are anticipated (Lazarus & Folkman, 1984). Feelings of uncertainty thus contribute significantly to the threatening nature of organizational change, especially when employees anticipate losing highly valued aspects of their job (Bordia et al., 2013). When change is nearly constant and civil servants are left with little to time to recover, perceptions of threat are like to become even stronger. The more frequently change occurs the more likely it is that core aspects of one's job, such as acquired benefits, rank, and expertise, will come under pressure (cf. Robinson & Griffiths, 2005; Bordia et al., 2013). Moreover, Lazarus and Folkman (1984) note that "even when a harm/loss has occurred, it is always fused with threat because every loss is also pregnant with negative implications for the future" (p. 32). Applied to a context of repeated organizational change, it implies that negative consequences suffered from earlier change events may continue to instill a sense of threat in civil servants, of more harm to come.

Having established that repeated change can pose a significant threat to civil servants, we turn to threat-rigidity theory to explore how civil servants and their organizations may react to such threatening work conditions.

Threat-rigidity theory

Threat-rigidity theory, developed by organizational psychologists Staw et al. (1981), examines the impact of a perceived threat on decision-making and behavioral patterns at the individual, group, and organizational levels. Staw et al. (1981: p. 502) broadly define a threat as "an event that has imminent negative or damaging consequences for the entity". They propose that a threat to the vital interests of an entity, be it an individual, group, or organization, will lead to rigid and inflexible behaviors rather than adaptive ones. Accordingly, due to its threatening nature, the theory has also been used to explain unexpected outcomes of intense organizational change, such as reduced creativity and detrimental effects on innovative cultures and climates (Bommer & Jalajas, 1999; Van Hootegem et al., 2019; Wynen et al., 2019). According to Staw et al. (1981), a threatening situation such as that posed by repeated change generates two main effects across various levels; a constriction in control and a restriction in information processing. The latter entails a narrowing in the field of attention, a simplification in the information being processed and a reduction in the number of information channels being used (Staw et al., 1981). A constriction in control refers to power and influence becoming more concentrated and moving towards higher levels of the organization's hierarchy – either formally or informally (Staw et al., 1981; 't Hart et al., 1993). Together, these effects will cause organizations to become more rigid in the face of threat. Next, we will discuss how these 'threat-rigidity effects' unfold at the individual, group and organizational levels.

Individual-level threat-rigidity effects

When individuals perceive a situation as threatening this is usually accompanied with a sense of urgency, as an inadequate response to the threat will allow the anticipated negative effects to unfold (Staw et al., 1981; Kleizen, 2019). The perception of having to urgently resolve a threatening situation will result in heightened levels of stress and anxiety throughout the organization (Staw et al., 1981). Increased levels of stress and anxiety will in turn have a number of cognitive and behavioral effects in employees. First, a restriction in information processing will manifest itself in individuals' tendency to hold on to prior expectations and fixed beliefs about their environment (Staw et al., 1981; Deverell, 2010). They will also be less capable of processing information that is not in line with these internally held expectations (Staw et al., 1981). Consequently, individuals will be less likely to consider alternative perspectives or to search for alternative solutions. Second, constriction in control will manifest itself in individuals' tendency to fall back on established routines and habitual responses when they are confronted with a threat (Staw et al., 1981). They will become more risk-averse and will display less innovative and creative behaviors (Bommer & Jalajas, 1999). In line with this, a number of studies have found that repeated organizational change

and associated uncertainty had a negative effect on innovative work behavior (Wynen et al., 2019; Van Hootegem, 2018). It is important to note that these individual-level effects affect all employees throughout the organization, including those at higher managerial levels (Olsen & Sexton, 2009). In times of organizational change, managers and employees alike may face uncertainty about the impact and consequences of change, making them equally prone to suffer from restricted information processing and a constriction in control.

Group-level threat-rigidity effects

To predict threat-rigidity effects at the group level, threat-rigidity theory distinguishes between threats emanating from an external source, and threats emerging internally (for instance stemming from internal incompetence) (Staw et al., 1981). When group members attribute a threat to an external source and feel they have a chance of successfully meeting the threat, the theory predicts increased cohesiveness, leadership support, and stronger pressures for uniformity (Staw et al., 1981). The need for group members to reduce uncertainty will motivate them to seek consensus. To achieve such consensus, group members will generally support the position of the existing group leader, while becoming more resistant to dissenting opinions (Staw et al., 1981). They will tend to ignore or downplay divergent solutions (cf. restriction in information processing), leading to increased uniformity (Staw et al., 1981; Kamphuis et al., 2008). As such, consensus seeking also involves a constriction of control, whereby opinions of dominant group members prevail and their influence becomes more centralized (Staw et al., 1981). This narrowing of group dynamics is also predicted to increase the salience of intragroup relationships over intergroup ties, leading to an increased cohesiveness among group members (Staw et al., 1981; Slyngstad, 2016). However, Staw et al. (1981) also suggest that increases in cohesiveness may be short-lived if a group fails to meet outside threats. In the case of sustained and clear-cut failure, the increased focus on in-group processes and relations may even exacerbate a loss in cohesiveness. On the other hand, a group which is successful, or at least not failing to meet an outside challenge, may sustain cohesiveness at a high level (Staw et al., 1981). When a threat emerges from perceived deficiencies within a group, and group members perceive a great likelihood for failure, the exact opposite is predicted to occur: group cohesion is likely to decrease and consensus is unlikely to follow (Staw et al., 1981). Experiences of failure are predicted to destabilize leadership support and contribute to a loosening of control, with members becoming more receptive to new information that may prove helpful in resolving the threat (cf. Driskell & Salas, 1991).

Here, the application of the theory to threat stemming from organizational change may be less straightforward, as organizational change can be perceived as a threat imposed by an outside force, or it may be perceived as a threat stemming from within (for instance if the threat stems from internal

incompetence to deal with change). Just like private sector managers, public managers are held responsible for the efficient implementation of change. Accordingly, the threat posed by change may be attributed to an internal source, if civil servants perceive the threat stems mainly from their managers' incompetence to effectively manage change. This may then result in decreased cohesiveness and uniformity in group structures, and thus more flexibility. However, in the public sector context, the initiative to change often stems from an external source (i.e. political field). This may make civil servants less prone to (fully) attribute the threat of change internally. Especially when the threat stems from repeated change, as is the focus of this research, we may assume civil servants may be less likely to attribute this threat to an internal source. Accordingly, we may rather expect to see an increased rigidity in work groups in public organizations confronted with repeated change. Article two of this dissertation offers a closer examination of threat-rigidity effects at the group-level.

Organizational-level threat-rigidity effects

in a threatened organization, managers are charged with ensuring continuity and improving performance as quickly as possible. As they feel the need to avert or mitigate the threat as soon as possible, a perception of urgency will quickly develop among them (Plotnick & Turoff, 2010). Threat-rigidity theory predicts this will lead to an increased centralization of decision-making authorities, a stronger formalization of decision-making procedures, and the generation of a control and command culture at the organizational level (Muurlink et al., 2012; Plotnick & Turoff, 2010). Since the timeframes for implementing organizational changes are often short and management needs to make decisions with a certain degree of urgency and uncertainty, managers will tend to centralize control in small 'in-groups' in order to quickly and decisively address the threatening event (Muurlink et al., 2012; Staw et al., 1981). This will also lead to a restriction in information processing, as attention fields are narrowed, and the number of information channels and complexity of communications are reduced (Staw et al., 1981). This will cause management to ignore peripheral cues in favor of already held assumptions (Staw et al., 1981). The centralization response described by threat-rigidity may occur through a formal redesign of decision-making structures as well as through various informal processes (Kleizen, 2019; 't Hart, 1993). Managers may for instance make a sub-conscious shift towards command and control management styles, becoming less receptive of deviant opinions thereby increasing pressures towards uniform behavior (Olsen & Sexton, 2009).

Interactions between levels:

Staw et al. (1981) emphasize that the threat-rigdity effects described at the individual, group, and organizational levels are interconnected and can reinforce one another. Rigidity arising at the individual level may propagate throughout a group, as individuals' tendency to ignore peripheral cues and focus on

already held assumptions strengthens internal group dynamics and outside signals are increasingly sidelined (Staw et al., 1981). This may foster groupthink and rigidity at the group level, and may contribute to overall organizational rigidity (cf. Janis, 1972). As noted, managers may also tighten control by forming decision-making in-groups. Combined with the individual-level restriction in information processing, this may mean that the organization as a whole becomes less capable of assimilating new information and unfamiliar cues (Staw et al., 1981). Conversely, rigidity at the organizational level can perpetuate individual and group rigidity through a culture that discourages experimentation and risk-taking. A highly rigid organizational structure, for instance, may stifle individual creativity, leading to reduced innovation and hampering the group's problem-solving capabilities (Cinar et al., 2019; Basadur et al, 2014). Several studies have suggested that these mechanisms may also be present in public organizations. Wynen et al. (2020, 499) argued that repeated structural reforms may trigger increased centralization and formalization on the managerial level, thereby decreasing support for novel ideas generated by employees and hindering innovation. Similarly, van der Voet and Lems (2022) found that threat-rigidity effects in civil servants could explain why negative budgetary performance lead to a reduced generation of creative policy solutions.

Finally, it is important to note that these threat-rigidity effects are not necessarily dysfunctional (cf. Deverell, 2010; Staw et al., 1981). Staw et al. (1981) propose that, when organizations are confronted with a familiar threat and know what to expect, a rigidity response may be instrumental in addressing the threat. However, when the environment changes in a radical or unpredictable manner, responding with rigidity will be maladaptive as prior, habitual responses are no longer appropriate under new conditions. In this case, threat-rigidity effects may result in detrimental outcomes, hindering effective decision-making and impeding organizational adaptability (Staw et al., 1981). We previously noted that public organizations face an increasingly turbulent operating environment that changes in highly variable, inconsistent, and unpredictable ways (Ansell & Trondal, 2017). In such an environment, we can assume a rigidity response will be dysfunctional and will ultimately undermine public organizations' capacity to adapt. Lastly, we noted that extant literature also offers an alternative prediction, with crisis flexibility theory suggesting that the threat of repeated change will cause managers to loosen control (formally or informally), leading to more decentralized, inclusive decision-making (Barnett & Pratt, 2000). Article 2 offers a more detailed discussion of crisis flexibility theory and juxtaposes it with the competing threat-rigidity theory.

While threat-rigidity helps us understand how individuals, groups, and organizations may respond to threats, it also runs on the assumption that a situation is uniformly perceived as a threat. This implies that a situation is either threatening or it is not, leading to stress or not. As such, the theory leaves a black box

in terms of what causes situations to be perceived as more or less threatening, and how this may lead to individual differences in stress responses and subsequent coping behaviors. Extant research demonstrates that even when people are confronted with the same event, they may interpret and cope with it very differently (e.g., Zacher at al., 2021; Avero et al., 2003). To better understand what contributes to individual perceptions of threat, and how civil servants coping behaviors may differ, this dissertation turns to Lazarus and Folkman's model of stress and coping (1984) and conservation of resources (COR) theory (Hobfoll, 1989). While clearly distinct, each of these theories explain how the subjective experience of threat will lead to stress, in turn inducing a range of possible cognitive and behavioral effects in individuals. An appreciation of the underlying stress and coping mechanisms is also necessary to understand the ultimate effect on the adaptability of civil servants and their organizations.

The next section provides a bird's eye view of both theories and highlights the main commonalities and differences between them by zooming in on the following questions:

1) What constitutes a threat, what makes a situation 'stressful'?
2) What are the different ways in which people may cope with a stressful situation, and what does this imply for adaptability?
3) Are there any temporal dynamics in the stress and coping process?

Transactional Model of Stress and Coping

The transactional theory of stress and coping, developed by Lazarus and Folkman (1984), has been instrumental in shaping stress and coping research over the past decades (Biggs et al., 2017). Inherent to this approach is the assumption that it is neither the individual nor the environment alone that produces stress, but rather that stress emerges from a complex transaction between the two (Folkman, 1984; Lazarus and Folkman, 1984). Specifically, Lazarus and Folkman propose that stress and subsequent coping behaviors emerge from a cognitive appraisal process, and differentiate between primary and secondary appraisal. They explain that individuals are constantly appraising stimuli (events, situations) within their environment. During primary appraisal, individuals evaluate to what extent the stimuli are relevant to them personally, and what their impact may be. If the stimuli are considered to be challenging, threatening, or harmful, a stress response will occur. Appraisals of threat or harm will usually be accompanied with negative emotions, centering on feelings of (anticipated) loss. Appraisals of challenge are more likely to occur when individuals believe an event also carries opportunities for personal growth and rewards. This is more likely to be accompanied with some form of positive emotions. Applied to organizational change, this implies change can be seen as both a challenge or a threat. However, Lazarus and Folkman (1984) note that the duration of a situation and the degree of uncertainty contribute

significantly to appraisals of threat. Hence, in line with our earlier discussion on change uncertainty and threat, this suggests threat appraisals of change become increasingly likely when change occurs repeatedly and uncertainty is prolonged. Besides these situational factors, Lazarus and Folkman also emphasize the role of personal factors in the appraisal process. Dispositional factors, including one's beliefs about the control one has (over the environment and oneself), can significantly impact threat appraisals. Individuals who believe to hold limited control will be more likely to arrive at threat appraisals of events (Lazarus & Folkman, 1984).

Through primary appraisal individuals thus determine the meaning and significance of an event to their wellbeing. If it is deemed stressful, individuals will be triggered to look for ways to manage the distress, which happens through secondary appraisal (Dewe and Cooper, 2007). During secondary appraisal individuals decide what coping strategy to engage in. Lazarus and Folkman have distinguished between two high-level coping strategies; problem-focused vs. emotion-focused coping. Whereas problem-focused coping is targeted at addressing the cause of the distress (the stressor), emotion-focused coping is aimed at managing the emotions associated with the stressful event (Lazarus et al., 1984; Callan, Terry, & Schweitzer, 1994). What strategy a person resorts to depends largely on the coping resources they have available (Lazarus & Folkman, 1984; Lazarus, 1991). In general, emotion-focused forms of coping (such as distancing oneself from the problem or minimizing it) are more likely to occur when people believe they do not have sufficient resources to deal with the problem (Lazarus & Folkman, 1984). When individuals perceive they have some control over the situation and have adequate resources, they are more likely to implement a problem-focused coping strategy (Lazarus et al., 1984; Terry, Callan, & Sartori, 1996). Both emotion- and problem-focused coping strategies can support individual (and ultimately organizational) adaptability (Baker & Berenbaum, 2007). Employees can address stressful situations by thinking about steps necessary to resolve a problem or situation (i.e. problem-focused coping) or they may seek social support, vent to coworkers, or attempt to reinterpret events more positively (i.e. emotion-focused coping) (Baker & Berenbaum, 2007). If, however, emotion-focused coping occurs through avoidance or denial of the problem or alienation from others, individuals' adaptive capacity will be undermined.

With regards to temporal dynamics, Lazarus and Folkman make some important remarks. Firstly, they emphasize that the stress process is a continuous *cycle* of transactions between individuals and their environment, (Biggs et al., 2017). The outcome of coping efforts paired with new information from the environment typically result in a process of cognitive reappraisal, in which the situation is reappraised to determine whether coping efforts have been successful in resolving the experienced distress (Lazarus and Folkman, 1984). In case coping efforts have been unsuccessful, this will trigger individuals to initiate further coping efforts. Continued failure to cope will ultimately have a detrimental impact on individual's

mental wellbeing (Edwards, 1992). Linking this to a context of repeated organizational change, we can see how successful coping can become increasingly difficult: as the threat or challenge associated with one change is being coped with, the next change already presents itself, making it increasingly difficult for an individual to conclude that their environment is no longer stressful. Secondly, Lazarus and Folkman note that threat and challenge can also occur simultaneously, and that the relationship between threat and challenge appraisals can shift as a situation unfolds. "A situation that is initially appraised as more threatening than challenging can come to be appraised as more challenging than threatening because of coping efforts which enable the person to view the situation in a more positive light, or through changes in the environment that alter the troubled person-environment relationship for the better" (Lazarus and Folkman, 1984, p.33). However, chances of such positive re-appraisals of organizational change will likely diminish as the frequency of change increases. Moreover, when change is nearly constant and the work environment remains ambiguous for prolonged periods of time, the person-environment relationship likely remains troublesome. This aligns with Lazarus and Folkman (1984) suggestion that when an event occurs in a chronic persistent pattern, allowing individuals no 'time off', we can expect a more persistent level of threat.

Conservation of Resources (COR) theory

Conservation of resources theory was developed by Hobfoll (1989) as a new attempt to conceptualize stress. Similar to Lazarus and Folkman's model of stress and coping, COR theory describes how stress emerges and what strategies individuals may resort to to deal with the distress. Whereas Lazarus and Folkman propose stress is the result of an individual's appraisal of a situation as threatening, harmful or challenging, Hobfoll (1989) explains stress through the concept of 'resources', which are argued to be more 'objective' elements that are present in a work environment. The central tenet of the theory is that individuals are motivated to protect and preserve their existing resources while also striving to accumulate new resources (Hobfoll, 1989). Resources are defined as "conditions, energies, or personal characteristics" that are valued for their own sake or because they facilitate the attainment of valued resources (Hobfoll, 1989, p. 516). Examples of resources are time, energy, money, social support, persistence, etc. (Hobfoll et al., 2018). Hobfoll (1989) argues resources are critical to understanding the stress process, and posits that stress occurs when individuals experience resource loss or perceive a threat of resource loss without obtaining reasonable resource gain.

COR theory further specifies that resource loss is disproportionately more salient than resource gain, referred to as the 'primacy of loss principle' (Hobfoll et al., 2018). This means individuals will place greater importance on preventing resource loss compared to the acquisition of new resources, especially when

they have few resources left (Hobfoll, 1989; Halbesleben and Bowler, 2007). The second key principle of COR-theory is that individuals must invest resources in order to protect against (further) resource loss, to recover from previous losses, and to gain additional resources (cf. 'resource investment principle') (Hobfoll, 1989; Hobfoll et al., 2018). Building on these two principles, Hobfoll has also elaborated on the dynamic nature of the stress process. He explains that as individuals lose resources, investing to acquire additional resources becomes increasingly difficult. These reinforcing dynamics of resource loss and the inability to (re-)gain resources may cause individuals to become trapped in a vicious cycle of resource loss, from which it is difficult to recover (Hobfoll et al., 2018). These dynamics also explain Hobfoll's argument that "that what is threatening to them [individuals] is the potential or actual loss of these valued resources" (1989, p. 516). Even when resources have already been lost, the threat is likely to persist or even intensify as people have fewer resources left to offset potential future resource losses. As such, COR theory can help us understand how stress develops over time, when employees are confronted with repeated change. Several studies have demonstrated that dealing with organizational change requires considerable resources (Bernerth et al., 2011; Rafferty & Griffin, 2006). When change occurs frequently without sufficient time to recover, employees may end up in a state of persistent resource-depletion. Meanwhile, resources -especially those of a psychological nature such as self-efficacy and optimism- have been identified as key to individuals' ability to adapt to stressful situations (Hobfoll, 2002). Moreover, when individuals constantly lose or fear to lose resources while not being able to prevent it, stress can become chronic (Clifton & Feeny, 2015; Hobfoll et al., 2018).

Finally, some remarks should be made on Hobfoll's notion of resources as 'objective' elements of a work environment. At first glance, this seems to differ significantly from Lazarus and Folkman's view of stress and coping, since they emphasize the role of subjective appraisal that determines whether or not a situation is stressful. Hobfoll on the other hand, suggests that is the (anticipated) loss of objectively present resources (time, energy, social support,…) that determines whether a situation is stressful. However, both perspectives do not essentially conflict. COR theory does not ignore Lazarus and Folkman's notion of appraisal but emphasizes common appraisals held jointly by people who share a culture or an organization (Chen et al., 2015). While it is argued COR theory focuses not on individual appraisals but on objective elements of threat and loss, it still centers on individuals' perception of their resources (and perceived loss and gain thereof) as determinants of stress (Chen et al., 2015). Individuals in an identical work environment may nevertheless make different assessments about their available resources and the appropriate strategies to protect them (Herr et al., 2021). In this respect, Lazarus and Folkman (1984) accurately note that:

> *"The ubiquitous nature of ambiguity, especially in stressful encounters, is one reason it is so difficult to identify independent situation characteristics; whenever there is ambiguity, person factors shape the understanding of the situation, thereby making the interpretation of the situation more a function of the person than of objective situational constraints." (p.104)*

The principle that personal dispositions play a more influential role under conditions of ambiguity than under conditions of clarity, offers important implications for the study of organizational change and employee reactions to it. It indicates that a focus is needed on individual perceptions of change rather than objective situational parameters, especially in research studying employee reactions to frequent change, a situation that is characterized by high and persistent levels of ambiguity (Rafferty & Griffin, 2006).

Table 2 provides an overview of the theories covered by each article.

Table 2. Theoretical framework

Articles	**Theoretical perspectives**
Article 1 - Does repeated change impact role clarity of civil servants?	Uncertainty (Bordia et al., 2004)
Article 2- Does repeated change impact the degree of centralized decision-making?	Threat-rigidity (Staw et al., 1981) + Crisis Flexibility Theory (Barnett & Pratt, 2000)
Article 3 - Does repeated change impact civil servant proactivity?	Transactional model of stress & coping (Lazarus & Folkman, 1984) + COR (Hobfoll, 1989)
Article 4 - Does chronic stress impact civil servant perceptions of change frequency?	COR (Hobfoll, 1989)

It should be noted that, for the study of work stress, authors also frequently rely on the Job-Demands Resources (JD-R) model from Bakker and Demerouti (2007). The model posits that stress and burnout develop when job demands outweigh job resources (Bakker & Demerouti, 2007). However, a limitation of this model is that is considers job demands as well as resources as external to the individual (i.e. provided by the employer). Hence, it underplays the role of individuals' cognition, emotion, and energy-related resources, such as optimism, self-beliefs, emotional wellbeing, etc. (Ojedokun & Idemudia, 2014). In recent years, efforts have been made to integrate these personal resources in the JD-R model (Bakker & Demerouti, 2017). However, these types of resources are more consistently accounted for in COR theory as well as Lazarus and Folkman's model of stress and coping. While the JD-R model does acknowledge that the balance between demands and resources may shift over time, COR-theory offers

more elaborate insight into the temporal dynamics of the stress process, and how individuals manage their resources over time. Given this dissertation's focus on individual-level responses to prolonged exposure to stressful work conditions, COR-theory and Lazarus and Folkman's model appear better suited than the JD-R model.

Role clarity, proactivity, and centralization of decision-making in a threat-rigidity framework

Since this research project is centered on evidencing threat-rigidity effects, we conclude this section by positioning the key dependents of this research -role clarity, proactivity, and centralization of decision-making- in a threat-rigidity framework. By examining the impact on these behavioral and work characteristics, we can test for threat-rigidity effects at various levels.

The first article of this dissertation explores the impact of repeated change on civil servants' level of **role clarity**. Role clarity is defined as the extent to which individuals clearly understand the duties, tasks, objectives, and expectations of their work roles (Katz et al., 1978). Based on threat-rigidity, a significant decrease in civil servants' role clarity is indicative of a *restriction in information processing* at the individual level. This aligns with the theory's prediction that employees will become more withdrawn and hold on to familiar beliefs and prior expectations concerning their role (Lazarus & Folkman, 1984). They will be less likely to seek clarification on roles that evolve quickly in organizations undergoing constant change, since new role information is likely to conflict with civil servants' existing understanding of their role. This may cause role ambiguities to linger on, especially when change is nearly constant and role information quickly becomes obsolete. Besides restricted information processing at the individual level, reduced role clarity may also point at *restricted information processes and a constriction of control* at the organizational level. When fewer employees can participate in decision-making as a result of control being centralized, it becomes more difficult to clarify role expectations. At the same, managers' tendency to reduce and simplify communication may further contribute to role ambiguity among lower-level employees. It should be mentioned that threat-rigidity predicts that a constriction of control will also be accompanied with increased formalization of procedures, which has been linked to increased role clarity in certain studies (e.g., Katsikea et al., 2015). In article 1 we can verify whether this predicted increase in formalization can outweigh other threat-rigidity effects that are expected to undermine role clarity.

Article 2 examines the impact of repeated change on civil servants' **individual autonomy and team-level autonomy**. Autonomy makes up a key dimension of centralization of decision-making (Lambert et al., 2006). Whereas job-autonomy refers to discretion in the planning and execution of individual tasks (Hackman & Oldham, 1975; Karasek, 1998), team autonomy refers to the same attributes in the tasks of

a team (Cordery et al., 1991; Hackman, 1987; Kirkman and Rosen, 1999; Langfred, 2000). By examing the impact on both individual- and team-level autonomy, we can verify to what extent threat-rigidity's *constriction of control*-dimension is present across various levels: a decrease in individual autonomy offers a general indication there is a constriction of control with decision authorities being centralized at higher levels in the organization. By also considering the impact on team-autonomy, we gain a better understanding of the level at which these threat-rigidity effects unfold: a decrease in both individual and team-level autonomy would indicate a constriction of control at the highest hierarchical levels of the organization. On the other hand, if a decrease in individual-level autonomy is accompanied with an increase in team-level autonomy, this may be indicative of a constriction of control unfolding at the team-level. This aligns with Staw's suggestion that in a decentralized organization a threat may induce a control response that dissolves weak links to the top while strengthening intra-unit links. Under these conditions, threat-rigidity effects may be concentrated at the level of work units (i.e. groups or teams), and a constriction of control may result in autonomy shifting from the individual towards that of the unit.

Article 3 explores what impact repeated change has on civil servant's **proactive behavior** at work. Proactive work behavior is defined as any self-directed and future-focused action to bring about change to one's work situation or within oneself (Grant & Ashford, 2008). Accordingly, proactive behaviors can include making suggestions to improve aspects of one's job (processes) or coming up with solutions to anticipated or recurring problems (Cangiano et al., 2019). At the individual level, threat-rigidity theory suggests that civil servants will react to the threat of repeated change by reverting to habitual behaviors (i.e. *constriction of control*) and by relying more on prior expectations and fixed beliefs about their work environment (i.e. *restriction in information processing*). Self-initiated actions to re-think aspects of one's job and come up with alternative solutions to make improvements would thus present the opposite of the effects predicted by threat-rigidity theory. Rather, the cognitive narrowing and habitual responses suggested by the theory would make proactivity highly difficult. Consequently, if repeated change causes a significant decrease in civil servant proactivity this would indicate that individual-level threat-rigidity effects are at play.

Table 3 presents an overview of the framework connecting role clarity, centralization of decision-making, and proactivity to threat-rigidity theory.

Table 3. Dependents in a threat-rigidity framework

	Threat-rigidity effect	**Level**
Proactivity	– Restricted information processing – Constriction of control	Individual
Centralization of decision-making: **individual autonomy** **team autonomy**	– Constriction of control	Team + organizational
Role clarity	– Restricted information processing – Constriction of control	Individual + organizational Organizational

Data & methodological approaches

This PhD uses both primary and secondary data, stemming from three different sources. Next, each data source and the properties of the collected data are discussed in more detail.

Belgian government agency

Context

Articles 2 and 3 make use of primary data, collected at a Belgian government agency at one of the federal or regional government levels. It is a large size agency responsible for service provision and policy development in the welfare sector. It has been undergoing major organizational changes over the past few years, following a merger. They were still in the process of implementing the merger throughout the data collection phase of this research, which started in spring 2021. In 2020, the agency gradually started to unify its managerial and IT-processes, introducing shared team leadership and new IT systems throughout the entire organization. Shared leadership centers around processes of collaborative decision-making and shared responsibility for outcomes among all team members (Hoch, 2013). At the time of data gathering, half of the agency's teams were already implementing shared leadership principles. This is an important contextual factor that will be given due consideration in the interpretation of the results derived from these data, particularly in article 2 which examines the impact of continuous change on individual- and team-autonomy. The intense change trajectory that the agency has undertaken in recent years makes it a highly suitable case to study the impact of repeated organizational change on civil servants and their organization.

"Stop all these changes, let people recover, get used to, and feel good about their jobs again." (survey comment from respondent 208846, Belgian agency)

Finally, during the data collection phase the agency also dealt with the consequences of the Covid-19 crisis. Most employees had to re-organize their work to some extent in order to comply with safety measures. The social distancing measures, for instance, required a thorough reorganization of the appointment and consultation system used with clients. Approximately 80% of the agency's employees were required to work remotely and had to shift from in-person communication with clients and coworkers to digital modes. Nevertheless, a significant part of the agency's workforce was not able to work from home. During the data collection, respondents were given clear instructions not to refer to COVID-related changes when expressing opinions on the frequency and impact of changes. This to avoid confounding effects of the pandemic on individuals' evaluation of (strategically planned) organizational changes.

Research design

The research conducted at the Belgian agency is longitudinal, consisting of quantitative data collected over two survey waves administered one year apart. The first survey wave ran from March to May 2021, the second survey ran from April to May 2022. Every employee received a personal email invitation to participate. Respondents (who gave permission) were assigned a unique identifier code so their responses could be linked across the two times of measurement, making it possible to construct a panel data structure. The survey asked respondents about their opinions of organizational change, in terms of frequency, impact, and the way it is managed. In addition, employees were asked about their wellbeing at work, and various characteristics of their work environment, including autonomy, social support, work pressures etc. Respondents also had the option to add an additional comment at the end of each survey, regarding organizational changes they experienced. These quantitative data were supplemented with qualitative data obtained through focus groups. From February to March 2022, eight focus groups took place in six of the agency's units that scored remarkably in the survey (i.e., they scored below or above average on certain questions). Care was also taken to ensure a balanced representation of local teams and central teams. A total of 45 staff members participated. The primary aim of these focus groups was to obtain more qualitative information to assists with the interpretation of the survey results. Given their

secondary role in this research, the findings of the focus groups will not be explicitly featured in this dissertation.[1]

Australian Public Service (APS)

The Australian Public Service refers to the federal civil service of the Commonwealth of Australia which comprises all departments and agencies where staff members are employed under the Public Service Act of 1999. The Australian context provides an interesting setting to study the effect of repeated organizational change on employee outcomes. Through the APS Reform Committee, there is a constant emphasis on rethinking the role of government and the need for change (Chowdhury and Shil, 2017). In its 2013-2014 State of the Service Report, the Australian Public Service Commission noted that organizational change has become a pervasive characteristic of APS organizations (APSC, 2014). For instance, in 2013, the amendments to the Administrative Arrangements Order resulted in widespread structural and functional changes for several organizations, affecting more than 13,000 employees (APSC, 2014). This makes the APS a suitable setting for a study on frequent organizational change. This dissertation uses data from the APS employee census, a survey that captures civil servants' attitudes and opinions on key issues such as wellbeing, innovation, leadership, and learning and development (APSC, 2014). While surveys are often directed at the top- and middle management level and biased towards particular types of organizational changes (Demircioglu & Audretsch, 2019), the APS census is sent to employees at all job levels and captures a wide variety of changes, such as machinery of government change, structural change, change in physical workplace and change in leadership. The 2014 census used in this research (see article 1) includes responses from 99,392 employees from 89 public agencies. The resulting data offer valuable insight into the diversity of workplace changes experienced by civil servants, combined with detailed information at the individual level. While the census is repeated every year, more recent survey waves include less individual-level information which make these less suitable for inferential statistical analysis.

Flemish municipalities

Article 4 uses data that were collected as part of the research project "Avoiding repetitive change injury: Can leadership behaviors mitigate the damaging side-effects of repetitive reforms?" (BOF 42338). Data were gathered at five municipal organizations in Flanders, Belgium. Since January 2019, all Flemish municipalities faced a structural re-organization following the decree on the integration of social service departments (OCMW's) with municipal administrations (decreet Lokaal Bestuur, Vlaams Parlement,

[1] A special thanks goes to Danika Pieters, prof. Bjorn Kleizen, and prof. Koen Verhoest. The collection and analysis of the agency data could not have been realized without their help.

2018). Implementation has been largely similar across the selected municipalities, being geographical neighbors and operating a number of services jointly. Each employ a similar number of people (ca. 60 white-collar employees), serve a similar size of population (approx. 10.000 inhabitants), and are concerned with the same core tasks. Four out of the five municipalities together make up an established, permanent partnership. The fact that these five municipalities have highly similar organizational characteristics and operate in similar contexts makes them particularly suited for a study on differences in perceived organizational change.

Across the selected municipalities, a total of 246 white-collar employees qualified to participate, of which 102 participated for the entire duration of the study. Data was collected at three points in times, every three months starting from May 2022. Participants were asked to complete a survey, in which they were asked about a range of work characteristics, including their wellbeing at work, their perception of organizational changes, and leadership. In addition, a small sample of hair was collected from each participant to measure the concentration of cortisol, an important stress hormone. This hair cortisol concentration (HCC) analysis provides an index of cortisol levels integrated over an extended period of hair growth, i.e. several months (Staufenbiel et al., 2013). As such, it allows to capture longer term, accumulated stress levels within individuals (Greff et al., 2019). Further details concerning the use of cortisol as a measure for stress and concerning the HCC analysis are provided in article 4. [2]

[2] A special thanks goes to Dries Van Doninck, prof. Jan Wynen, prof. Laurence Roosens, prof. Christophe De Block, and prof. Jan Boon, who lead the research project at the municipalities and were responsible for the collection and analysis of the data.

Article 1: Blurred lines: Exploring the impact of change complexity on role clarity in the public sector.[3]

Introduction

Over the past few decades, social, economic, and political developments have forced public organizations to continuously adapt to their changing environment, leading to ongoing cycles of reform (Damanpour & Gopalakrishnan, 1998; Pollitt, 2007; Valle, 1999). More recently, novel developments such as Brexit, the rise of social media and artificial intelligence (AI), and the ongoing COVID 19-pandemic can be expected to inspire yet another series of reform, targeting public organizations' strategies, structures, and practices (Lewis & Cho, 2011; Tursunbayeva, et al., 2017; Vann, 2004). Paradoxically, while public organizations increasingly turn to organizational change in attempt to improve their adaptability and performance, the opposite might be achieved in terms of impact on employees (Brunsson, 2009). In particular, studies indicate orga- nizational change can negatively impact the extent of role clarity employees experience (Jimmieson et al., 2004; Kahn et al., 1964; Katz & Kahn, 1978; Lyons 1971). Kahn et al. (1964) explain that organizational change can hinder role clarity in different ways, for instance through changed work procedures or through personnel changes, which all produce increasing ambiguities for the employees involved. While these studies have explored the impact of organizational change on role clarity (e.g., Jimmieson et al., 2004; Kahn et al., 1964; Lyons, 1971), they devoted surprisingly little attention to the conceptualization of change and the increasing incidence of change in public organizations, potentially overlooking any aggregated effects of ongoing change. Therefore, this study takes a novel perspective by focusing on the impact of change complexity, accounting for the simultaneous occurrence of various types of change (such as changes in work procedures, leadership, job tasks, and organizational structures) in a short period of time. Since public organizations are confronted with increasingly rapid change processes, with one type of change often instigating or impacting another (i.e., a merger spurring personnel reductions and a location change), it seems imperative to study the aggregated effects of the occurrence of different types of organizational changes (McMurray, 2007; Pollitt, 2007) over short periods of time.

Organizational changes typically bring along a phase of transition, a period of organizational drift characterized by uncertainty and ambiguities concerning organizational structures, roles, and procedures (Bordia et al., 2004, Seo & Hill, 2005; Smollan, 2005). This in turn can cause significant turbulence for individual employees at the work-unit level. Specifically, a lack of role clarity has been identified as a key

[3] This article was co-authored by prof. Jan Wynen, dr. Bjorn Kleizen, and prof. Koen Verhoest. It is published as an article at Review of Public Personnel Administration.

stressor for employees (Gilboa et al., 2008; Kim et al., 2014; Ngo et al., 2005; Slattery et al., 2008; Tubre & Collins, 2000). In the specific context of public organizations, Tummers et al. (2009) postulate it might even lead to policy alienation among civil servants, a situation in which they begin to feel disassociated from policy implementation processes and goals due to a lack of clarity on the type of responsibilities and tasks they are expected to execute.

To better capture the current reality of public organizations being swamped by change, we examine the impact of change complexity, accounting for the simultaneous occurrence of various types of change over a short period of time. While we can expect most change processes to be characterized by a certain degree of complexity, we argue there can be significant variations in the degree of complexity. A change trajectory comprising a multifaceted change process—such as a major strategic change entailing various procedural and structural changes—will likely be more complex and cause more turbulence for employees at the work unit-level, compared to a change in leader- ship. When employees are confronted with a period of high change complexity, in which they experience a high number of diverse types of changes in a short timeframe, it not only leaves them with little time to recover in between changes (Seo & Hill, 2005) but it can also make it increasingly difficult for them to build resilience for sub- sequent changes (Dougall et al., 2000). We therefore expect that, as employees deal with more diverse types of changes affecting their roles (i.e., high change complexity), this will lead to a further decrease in role clarity.

By analyzing data of the Australian Public Service Employee Census, we examine if we can find evidence of decreased role clarity in individuals who experienced a period of high change complexity. This article seeks to contribute to the extant literature on organizational psychology, public administration, and human resources management (HRM) by focusing on the impact of diverse types of changes that have occurred within a relatively short timeframe. Prior research traditionally defined and studied change as single, isolated events. We maintain these fields would benefit from a more holistic approach to the study of organizational change and its impact on employees. Because of their (implicit or explicit) conceptualization of change as isolated events, earlier studies may have failed to capture how different changes interact with one another, and what cumulative impact diverse changes have on employees. Consequently, by studying the impact of change complexity, we intend to fill this gap in extant literature by accounting for the potential accumulating effects of diverse changes experienced over a short period of time. The remainder of this article is organized as follows: The next section theoretically links role clarity and organizational change and elaborates on the dynamics of role clarity in the context of high change complexity. The data and analyses are presented in section 3, followed by a discussion of the main findings and concluding remarks.

Literature review

Linking organizational change and role clarity

To meet ever-increasing citizen demands and address novel challenges, public organizations increasingly turn to organizational change (MacCarthaigh, 2012). This often leads organizations to undergo periods of fast-paced change, with change trajectories that become increasingly complex. These change trajectories can consist of different (potentially overlapping) change initiatives or of a series of "sub-changes" that form part of a larger multifaceted change initiative (for instance in the case of a merger entailing subsequent lay-offs, structural changes, and changes in leadership). Organizations in the middle of such change trajectories will usually find themselves in a transitional phase, in which new roles and structures are only partially established while old structures and roles are already being made redundant (Smollan, 2005). Hence, organizational changes often bring along—at least temporary—uncertainty and ambiguities in organizational structures, roles, and procedures (Bordia et al., 2004, Smollan, 2005). As change trajectories become more complex and encompass more diverse types of changes, the more ambiguities are likely to arise.

While employees are likely to experience uncertainty over many different facets of a changing work environment (Jimmieson et al., 2004), our focus is on the impact of change on role clarity. Role clarity can be defined as the extent to which individuals clearly understand the duties, tasks, objectives, and expectations of their work roles (Katz & Kahn, 1978). It has also been referred to as a lack of role ambiguity, which can be considered the opposite of and inversely interchangeable with role clarity (Rizzo et al., 1970). The harmful impact of role ambiguity (or lack of role clarity) on organizations and their employees has already been well documented in extant literature (e.g., Gilboa et al., 2008). For individual employees, the absence of role clarity has been identified as an important stressor that is negatively associated with several relevant organizational outcomes such as employee performance (Gilboa et al., 2008; Tubre & Collins, 2000), organizational commitment and job satisfaction (Kim et al., 2014; Ngo et al., 2005; Slattery et al., 2008).

Bordia et al. (2004)—who distinguish between three different types of change related uncertainty: strategic, structural, and job-related uncertainty—classify role ambiguity as a type of job-related uncertainty. Importantly, they found that job-related uncertainty has the most profound impact on employees' ability to deal with organizational change, which can be explained by the fact that such job-related issues will have the greatest impact on employees at the work unit-level (Klein, 1996). Interestingly, Bordia et al. (2006) also highlight the impact of rumors in contributing to employee concerns

during organizational change. They explain that even the mere announcement of planned changes can already lead to perceived uncertainty about what some- one's role in that changing organization will be (Bordia et al., 2006; Seo & Hill, 2005). Even though we cannot control for this aspect in our research, we should take into consideration this could also manifest itself in an anticipatory form of role ambiguity.

In times of change, role clarity is often low or absent with employees not knowing how changes will affect their roles, which can be particularly stressful (Bordia et al., 2004). Berger (1987) attributes this to the observation that people have two fundamental needs: (1) predictive needs, concerned with the ability to predict what is going to happen next and (2) explanatory needs, concerned with the ability to explain why things are as they are, both of which are frequently compromised during organizational change. Even though management usually strives to address this uncertainty through communication and dedicated change management, these attempts often fall short (DiFonzo & Bordia, 1998). In the context of organizational change, role clarity has been identified as a key resource for employees in coping with change and its implications. Various scholars have found that it can mitigate the negative effects of high job demands, which frequently arise during organizational change (Bakker & Demerouti, 2017; Bliese & Castro, 2000; Saksvik et al., 2007) However, as previously mentioned, change trajectories are usually characterized by a period of inherent uncertainty, which can compromise role clarity. Accordingly, Kahn et al. (1964) identified organizational change as a key factor contributing to greater role ambiguity (or lesser role clarity). Change trajectories that require frequent restructuring of work practices have been found to hinder role clarity and thus increase role ambiguity (Jimmieson et al., 2004; Lyons, 1971). Thus, paradoxically, while role clarity is an important coping resource during times of organizational change, such change will often lead to the exact opposite, being role ambiguity.

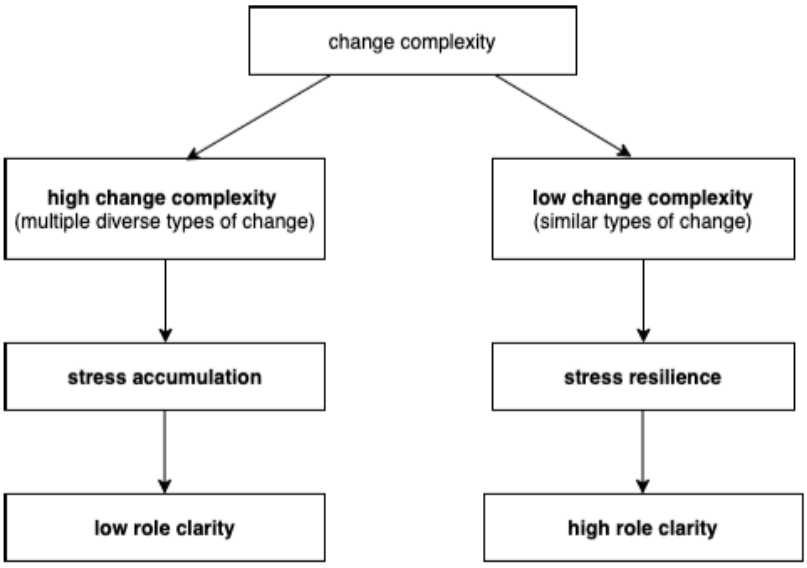
Role clarity in a context of high change complexity

As mentioned, a number of studies have already addressed the negative impact change can have on role ambiguity (Jimmieson et al., 2004; Kahn et al., 1964; Lyons, 1971), a type of uncertainty that can be particularly prevalent in changing organizations. However, the conceptualization of organizational change has received relatively little attention in literature so far, resulting in fairly simplistic conceptions of change. In addition, few studies have accounted for the observation that organizations increasingly face diverse types of changes rapidly succeeding or even overlapping each other in time. Moreover, Smollan (2015) found that organizational change effects can persist even after a change has been formally completed, supporting the notion that organizational change can be seen as a continuous process, with different types of changes overlapping one another and where the outcomes and impact of one change can influence those of another set of changes (Brunsson, 2009; Wynen et al., 2019). We expect that, as

change trajectories become more complex and encompass more diverse types of changes in shorter periods of time, the more role ambiguity is likely to arise.

We arrive at this proposition by drawing on insights from the literature on exposure to repeated stressors, in our case, exposure to repeated organizational change. Interestingly, two models exist that each predict opposite effects of exposure to repeated stressors: On the one hand, the stress-accumulation model posits that stress and uncertainty will accumulate and will negatively affect individuals' coping resources, ultimately harming the individual (Moore et al., 2004). Accordingly, Moore et al. (2004) and Grunberg et al. (2008) found that work-related stressors, including role ambiguity, accumulated in employees who experienced multiple changes. On the other hand, the resilience model states that individuals who have experienced repeated stressors are strengthened by these experiences and are better prepared to face subsequent stressors (Dougall et al., 2000). While evidence for both models is mixed and points at the relevance of contextual factors, Dougall et al. (2000) argue the resilience model has validity when individuals are confronted with repeated but similar stressors, while the stress-accumulation model will be valid in situations of varied types of stressors. Drawing the parallel to our line of research, we expect that individuals who experience more diverse types of change in a short timeframe will report significantly lower levels of role clarity, since constant expo- sure to new types of change might prevent them from building resilience toward change (cfm. Dougall et al., 2000). In Figure 1.1, a schematic representation of our main theoretical arguments is presented.

Figure 1.1. Theoretical framework



Based on the exploration of the above-mentioned theoretical models and the findings from Dougall et al. (2000), we expect the stress accumulation model will be applicable to individuals who have been confronted with a situation of high change complexity, causing them to experience less role clarity. We can formulate the following hypothesis:

Respondents who have experienced a period of high change complexity will report significantly lower levels of role clarity, compared to those who have experienced a period of low change complexity.

Data and measures

To explore the effect of change complexity on role clarity, we make use of data from the Australian Public Service (APS). The APS is the federal civil service of the Commonwealth of Australia, which comprises all departments and agencies where staff members are employed under the Public Service Act of 1999. The Australian context provides an interesting setting to study the effect of high change complexity on employee outcomes. Through the APS Reform Committee, there is a constant emphasis on rethinking the role of government and the need for change. In its 2013 to 2014 State of the Service Report, the Australian Public Service Commission noted that organizational change has become a pervasive characteristic of APS organizations (APSC, 2015). For instance, in 2013, the amendments to the Administrative Arrangements Order resulted in widespread structural and functional change for dozens of organizations, affecting more than 13,000 employees in the process (APSC, 2015).

We rely on data from the APS 2014 employee census (which includes responses from 99,392 employees from 89 public agencies). The survey captures attitude and opinion data on important issues such as wellbeing, innovation, leadership, learning and development, and the engagement of the APS workforce (APSC, 2015). The 2014 wave of the census offers a unique glimpse into the diversity of workplace changes experienced by civil servants combined with detailed information about the individual (more recent survey waves include much less individual-level information). While surveys are often directed at top- and middle management level and biased toward particular types of organizational changes (Demircioglu & Audretsch, 2019), the APS census was sent to employees at all job levels and captures a wide variety of change ranging from machinery of government changes to a change in work priorities.

The sample was compared to the overall APS population on gender, classification, location, and employment category, and no significant difference could be detected. The sample was further reduced to 76,275 observations due to item non-response. Although such a large sample size can have its advantages, it can also lead to erroneous results. A large sample size is likely to make the standard errors

extremely small, in turn making even minuscule distances between the estimate and the null hypothesis statistically significant (Lin et al., 2011). To avoid mislabeling results as statistically significant, we relied on a randomly selected sample of 10% from the available observations. To ensure that this did not introduce any bias, a chi-square goodness of fit test was conducted to compare sub-samples values (7,627) with values from the initial sample (e.g., gender, age, and classification level; 99,392 employees). The subsample is similar to the initial sample.[4]

Measuring role clarity

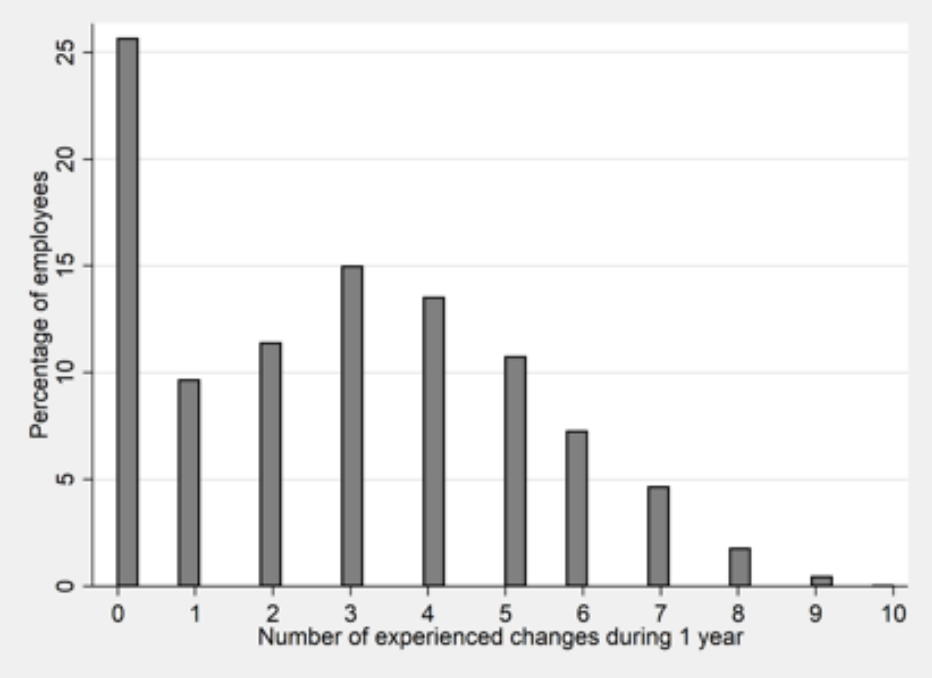
Role clarity is measured using the question: I am clear what my duties and responsibilities are. Respondents were offered the following answer categories; Never, Rarely, Sometimes, Often or Always. This item aligns very closely with the 6-item scale from Rizzo et al. (1970), a commonly used operationalization of role clarity in literature (e.g., items includes "I know exactly what is expected of me" and "I know what my responsibilities are"). Descriptive analysis shows most civil servants report to often (47.88%) or always (34.43%) have role clarity. However, 13.32% of respondents indicate to only have role clarity sometimes. About 3.44% Of respondents report experiencing role clarity rarely, while 0.93% indicate they never have role clarity.

Measuring change complexity

For our subsequent analyses of change complexity—which we described as the number of diverse types of change experienced in short period of time—we build on the following question: Which of the following changes impacted your work group in the last 12 months. Respondents were not limited to one specific change but could indicate several or even all of them. They were offered 11 possible answer categories: change in physical workplace, machinery of government change, relocation to a new city, structural change, functional change, change in work priorities, decrease in staffing numbers, increase in staffing numbers, change in SES leadership, change in supervisor, and others. Figure 1.2 offers an overview of the number of different changes employees experienced.

[4] For example, gender ($\chi^2(1)=1.72$), age ($\chi^2(3)=0.71$), classification level ($\chi^2(1)=0.01$), having experienced an organizational change in the past year ($\chi^2(1) = 0.01$)

Figure 1.2. Overview number of different changes experienced.



When studying Figure 1.2, we notice that roughly 25% of respondents did not experience any change while the remaining 75% experienced at least one type of workplace change in the previous year. Interestingly, roughly 25% of the respondents in our sample experienced more than four different changes during this period. On average they experienced more than one specific change every 3months. This high diversity of experienced changes points to a period of high change complexity. We should note that a wide definition of organizational change is applied here, which encompasses large-scale and fundamental transformations, such as downsizing and restructurings, as well as smaller changes, such as moving offices or a change in manager (see Kiefer et al., 2015). The main benefit of this conceptualization is its deliberate focus on the employee (work- unit) level to measure how employees experienced change within the organization. Admittedly, not all change is equal, some types of change will have a stronger impact on individuals and consequently lead to stronger negative side-effects on role clarity. This is an issue we cannot account for as it purely depends on an individual's evaluation of change, making it impossible to make general claims (Biggs et al., 2017; Lazarus & Folkman, 1984; Wynen et al., 2019). The same organizational change may be minor for one work unit or individual within a work unit, and major for another unit or individual. For instance, it is impossible to state whether a change in work priorities leads to stronger negative feelings compared to a change in supervisor or even a machinery of government change. For what follows, we therefore consider all change events as equal and purely focus on the perception of the number of diverse changes experienced as a proxy for change complexity.

Methodology and results

As mentioned earlier, theory suggests that role clarity is strongly related with the number of diverse changes experienced. To test this hypothesis, we conduct a Kruskal Wallis test, which is the non-parametric version of ANOVA and a generalized form of the Mann- Whitney test method since it permits two or more groups. This approach allows to test for differences in the means of the number of different changes experienced (change complexity) broken down by the levels of role clarity. Our results show that the mean of the amount of different changes experienced differs significantly among the levels of role clarity ($\chi 2(4)=153.422^{***}$ and 157.641^{***} with ties): respondents who indicated never having role clarity experienced on average 3.845 different changes; those who rarely have role clarity reported on average 3.771 different changes; respondents indicating they sometimes have role clarity reported on average 3.338 different changes; those indicating they often have role clarity reported experiencing on average 2.798 different changes; and those stating they always have role clarity experienced on average 2.450 different changes. This seems to be in line with our hypothesis: the more different types of changes are experienced; the lower role clarity.

However, this finding can be misguiding as organizational change is often introduced to alleviate existing organizational problems (Brunsson, 2009), while these problems are likely to simultaneously undermine role clarity (Abrahamson, 2004). Is the observed, reduced role clarity a reaction to pre-existing problems or a reaction to the changes that are aimed to solve these problems? The application of a propensity score matching estimator is employed to reveal if and to what extent these differences can be attributed to high change complexity (e.g., Heckman et al., 1997). How role clarity would have been affected in case individuals did not experience complex change is a counterfactual situation that is not observable and, hence must be estimated. Using propensity score matching, this potential outcome of individuals who experienced complex change is constructed from a control group of individuals who did not experience complex change. The matching essentially relies on the idea to balance the sample of individuals who experienced complex change and those who did not experience such change. Remaining differences in the outcome variable (role clarity) between both groups are then attributed to the treatment (complex change; Heckman et al., 1997). To apply this technique, we construct two different groups (one control and one treatment group). For what follows the control group exists out of those individuals who experienced no changes or those that experienced changes but less than the average (the mean of the number of diverse changes experienced equals 3.7). The treatment group (i.e., the group that experienced high change complexity) consists out of those individuals that experienced more than three different changes over the course of 1 year.

We start the matching procedure by conducting a logit estimator to obtain the predicted probability of experiencing high change complexity (dependent is the dummy, having experienced high change complexity or not). To do so, we included multiple variables that can affect the likelihood of experiencing workplace changes. First, we included each employee's perception of the agency's working environment. The APS survey includes a section "General impressions: Agency," in which respondents were asked to rate their level of agreement with statements concerning a wide range of underlying concepts ranging from change management to the culture of the work unit. The variable used in the analysis is a factor score based on a total of 23 questions (which are reversed coded) regarding the agency's working environment. The full list of variables, factor loadings, and eigenvalues is available in the Appendix (Table 1.5). The higher the score, the less satisfied the employee is with the agency's working environment. A drawback of this cumulative approach is the relative lack of substantive coherence. However, we want to point out here that the index does have coherence: not in the sense that it captures items related to similar processes (e.g., performance management, change management) or actors (e.g., leadership, colleagues), but in the sense that it captures an underlying overall sentiment toward the organization (Lee & Van Ryzin, 2019). It is the sentiment that connects the items (as shown by the satisfactory factor loading) and which is expected to reflect a widespread negative perception toward the organization across organizational processes.

Given that employee dissatisfaction with the current state of affairs is recognized as an important instigator of change (Brunsson, 2009; De Vries & Balazs, 1999), we expect that more widespread dissatisfaction across organizational processes will be related to more diverse changes. In addition, we include the agency's functional cluster to account for the primary functions of the organization. This includes specialist organizations providing specialist support to government, regulatory organizations involved in regulation and inspection, policy organizations involved in the development of public policy, smaller operational organizations with less than 1,000 employees involved in the implementation of public policy, and finally, larger operational organizations with 1,000 employees or more involved in the implementation of public policy. Finally, and as we rely on an individual's perception of change, we control for individual characteristics such as gender, education (Year 12, Vocational, Tertiary), and the classification level of each respondent (Trainee/Grad/APS1–6; EL/SES). The descriptive statistics are presented in Table 1.1. As one can see, these variables differ significantly across both the control and treatment group. When focusing on our variable of interest, role clarity, we notice that large differences exist between both our groups. For instance, individuals within our control group (low change complexity) are 8% more likely to always have role clarity compared to those in our treatment group (high change complexity).

Table 1.1. Descriptive statistics

Variables	Selected control group, N=4701	Treatement group, N=2926	p-value of tests on difference	Applied test
	Covariates			
Agency Cluster			<0.001	Pearson's chi-squared
Specialist	386 (8.2%)	159 (5.4%)		
Regulatory	206 (4.4%)	93 (3.2%)		
Policy	747 (15.9%)	856 (29.3%)		
Smaller operational	210 (4.5%)	107 (3.7%)		
Larger operational	3152 (67.0%)	1711 (58.5%)		
Scores for general impressions (agency), mean (SD)	-0.1 (0.9)	0.2 (1.0)	<0.001	Two sample t test
Gender			0.44	Pearson's chi-squared
Male	2010 (42.8%)	1225 (41.9%)		
Female	2691 (57.2%)	1701 (58.1%)		
Education			<0.001	Pearson's chi-squared
Year 12	1380 (29.4%)	718 (24.5%)		
Vocational	472 (10.0%)	305 (10.4%)		
Tertiary	2849 (60.6%)	1903 (65.0%)		
ActualClass			<0.001	Pearson's chi-squared
Trainee/Grad/APS1-6	3370 (71.7%)	1893 (64.7%)		
EL/SES	1331 (28.3%)	1033 (35.3%)		
Estimated propensity score, mean (SD)	0.4 (0.1)	0.4 (0.1)	<0.001	Two sample t test
	Outcome variable			
Role clarity (I am clear what my duties and responsibilities)			<0.001	Pearson's chi-squared
Never	33 (0.7%)	38 (1.3%)		
Rarely	112 (2.4%)	150 (5.1%)		
Sometimes	519 (11.0%)	497 (17.0%)		
Often	2262 (48.1%)	1390 (47.5%)		
Always	1775 (37.8%)	851 (29.1%)		

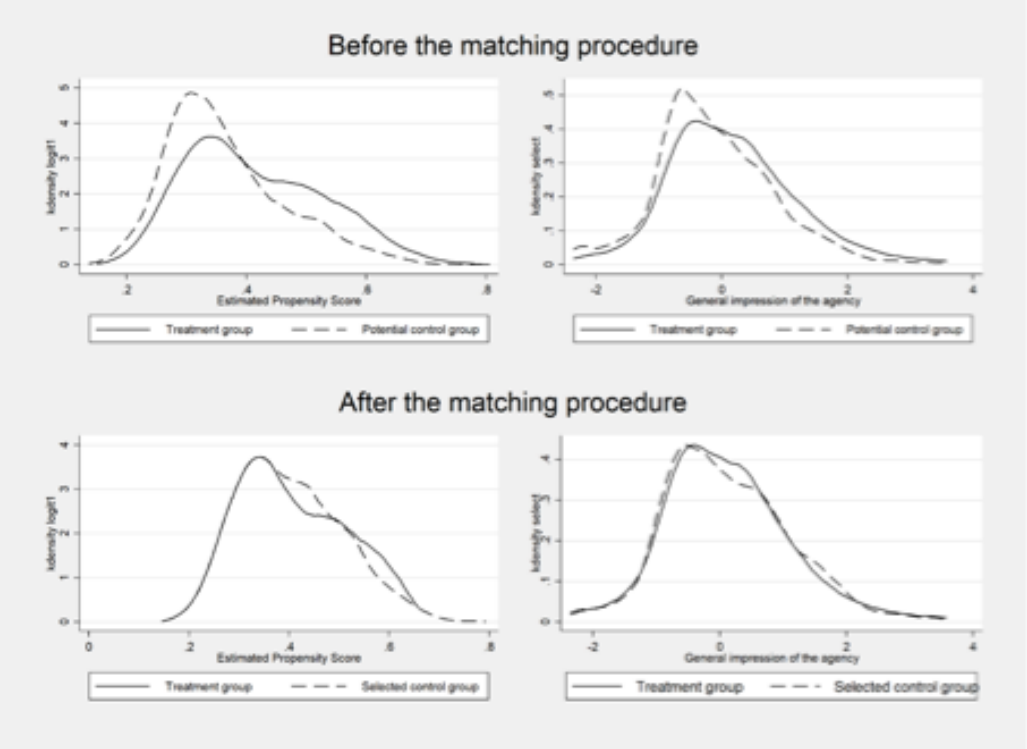
Table 1.2. Logit estimation on having experienced complex change or not.

Experiencing complex change (complexer than average)	Odds Ratio	Std. Err.	z-value	p-value	[95% Conf.	Interval]	Sig.
Cluster (Larger operational is omitted)							
Specialist	0.770	0.078	-2.590	0.010	0.632	0.939	*
Regulatory	0.831	0.109	-1.410	0.159	0.643	1.075	
Policy	2.073	0.126	11.980	0.000	1.840	2.335	***
Smaller operational	0.909	0.113	-0.770	0.443	0.712	1.160	
Gender	1.078	0.053	1.510	0.132	0.978	1.188	
Education (Tertiary is omitted)							
Year 12	0.849	0.050	-2.770	0.006	0.757	0.953	**
Vocational	1.035	0.086	0.420	0.674	0.880	1.218	
Actual classification (EL/SES is omitted)							
Trainee/Grad/APS1-6	0.805	0.045	-3.920	0.000	0.723	0.897	***
General impressions of the agency's culture	1.363	0.034	12.360	0.000	1.298	1.432	***
Constant	0.581	0.051	-6.190	0.000	0.489	0.690	
Cragg-Uhler/ Nagelkerke R^2		0.067		Number of obs		7627	
Joint-significance Cluster		$\chi^2(4)=178.58$***		Joint-Significance Classific		$\chi^2(1)=15.36$***	
Joint-significance Education		$\chi^2(2)=9.01$***		McKelvey R^2		0.063	

The results (odds ratios) of our analysis on the likelihood of being in a control or treatment group (experiencing high change complexity) are presented in Table 1.2. Cluster, education, and classification level appear to significantly affect the likelihood of experiencing high change complexity. However, and in line with the literature (Brunsson, 2009), perceptions regarding the agency's working environment appear to play a pivotal role. This index appears to be a strong indicator of experiencing high change complexity. Using these results, we calculate propensity scores (see the significant difference in average scores in Table 1.1). Based on the estimated propensity scores, the nearest neighbor is selected out of the group of individuals who did not experience high change complexity (control group) for those who did experience high change complexity (treatment group). Individuals from the control group are matched to those in the treatment group; see Czarnitzki and Lopes-Bento (2012) for more detail regarding the matching protocol ("hybrid matching").

The Kernel density estimations of the matching arguments, the propensity scores, and perceptions regarding the working environment, before and after the matching, are presented in Figure 1.3.

Figure 1.3. Kernel density estimates of the propensity score and the general impressions of the agency.



When focusing on both variables before the matching procedure, we notice their distributions are not similar across both the treatment and control group and appear to differentiate strongly. After the matching procedure, we notice that the distributions of the propensity score and the impressions regarding the organizational environment are more closely aligned across employees having experienced high change complexity (treated) and those who did not experience this (control). Both groups of employees are now well balanced with respect to the matching arguments after performing the estimation (see Table 1.3). When looking at our main variable of interest, role clarity, we notice that their values remain significantly different across both groups; differences that can be assigned to the treatment (experiencing high change complexity over the period of 1 year). However, it is also clear that the impact is now less pronounced. For instance, for those having indicated to always have role clarity, the difference between both groups dropped from 8% to 5%. Although still a significant and important difference, it shows that part of our initial effect can be attributed to pre-existing problems. The issue hence seems to be more nuanced: pre-existing problems cause a lower role clarity, however, when organizations start to (over) react, it makes the problem worse.

Table 1.3. Matching results

Variables	Selected control group, N=2861	Treatement group, N=2861	p-value of tests on difference	Applied test
	Covariates			
Agency Cluster			0.43	Pearson's chi-squared
Specialist	163 (5.7%)	159 (5.6%)		
Regulatory	97 (3.4%)	93 (3.3%)		
Policy	728 (25.4%)	791 (27.6%)		
Smaller operational	103 (3.6%)	107 (3.7%)		
Larger operational	1770 (61.9%)	1711 (59.8%)		
Scores for general impressions (agency), mean (SD)	0.1 (1.0)	0.1 (1.0)	0.78	Two sample t test
Gender			0.65	Pearson's chi-squared
Male	1223 (42.7%)	1206 (42.2%)		
Female	1638 (57.3%)	1655 (57.8%)		
Education			0.78	Pearson's chi-squared
Year 12	739 (25.8%)	716 (25.0%)		
Vocational	296 (10.3%)	300 (10.5%)		
Tertiary	1826 (63.8%)	1845 (64.5%)		
ActualClass			0.72	Pearson's chi-squared
Trainee/Grad/APS1-6	1893 (66.2%)	1880 (65.7%)		
EL/SES	968 (33.8%)	981 (34.3%)		
Estimated propensity score, mean (SD)	0.4 (0.1)	0.4 (0.1)	0.054	Two sample t test
	Outcome variable			
Role clarity (I am clear what my duties and responsibilities)			<0.001	Pearson's chi-squared
Never	29 (1.0%)	33 (1.2%)		
Rarely	93 (3.3%)	142 (5.0%)		
Sometimes	376 (13.1%)	472 (16.5%)		
Often	1380 (48.2%)	1369 (47.9%)		
Always	983 (34.4%)	845 (29.5%)		

However, it is still unclear how this treatment effect evolves when change complexity increases (i.e., how or whether this effect changes as the amount of diverse types of changes experienced increases). As presented in Figure 1.2, it is not unlikely that respondents experience more than four changes. This makes it interesting to test whether the estimated treatment effect increases with the number of changes experienced or whether we witness a decrease in effect, indicating that when change complexity is already high, an extra change event does not matter. To test this, we regress the estimated treatment effect, α, on the number of different changes an individual experienced. As presented in Table 1.4, we notice that an increase in change will not reduce the negative effects on role clarity. The opposite is true, even when change complexity is already high, extra change events will further undermine role clarity.

Table 1.4. Regression on the treatment effect on the number of different changes experienced.

	Dependent variable: α		
	Coef.	Std. Err.	P>|t|
Number of diverse changes	-0.057	0.017	0.001
Intercept	0.178	0.094	0.058
Number of observations	2861		
Overall significance	F(1,2859)=10.61**		

***(**,*) indicate a significance level of 0.1% (1%, 5%)

Discussion and conclusion

Our results suggest that complex change is positively associated with perceived role ambiguity, ambiguity regarding an employee's duties and responsibilities. It seems that introducing simultaneous change initiatives that affect an employees' work environment, for instance regarding supervision, tasks, working procedures, working location, team structures, performance evaluation criteria (e.g., when leadership changes), and strategic priorities, can substantially affect employee role perceptions. Several explanations could exist for such phenomena. First, managers developing and introducing change usually suffer from at least some degree of bounded rationality, implying they are frequently incapable of fully predicting up front how a change process should and will be implemented at frontline civil servant levels (Saksvik et al., 2007; Seo & Hill, 2005). Simultaneously, the definition and roll-out of a change process itself is frequently an emerging process subject to iterative phases of redefinition (see, e.g., garbage can models of change, which see organizational decision-making as a process of continually reoccurring rearrangements (Cohen et al., 1972)). This means that change processes—even during their implementation stages—are frequently unclear regarding their implications for the duties and roles that civil servants are expected to perform (Seo & Hill, 2005). The resultant lack of understanding employees may experience over these changing factors may lead to perceived role ambiguity, a state in which employees experience a lack of

understanding regarding (the future direction of) their duties and responsibilities (Allen et al., 2007; Saksvik et al., 2007).

The primary added value of the article, however, lies in its finding that more complex change trajectories result in higher levels of role ambiguity than less complex change trajectories. Measuring change complexity as the diversity of change that a respondent has experienced over the past year (Wynen et al., 2020), our results suggest that increasing the number of simultaneously occurring types of change further increases perceptions of role ambiguity. This result has intuitive appeal and coincides with Abrahamson's (2004) notion of initiative overload, with the presence of multiple change types having a compounded and negative effect on the degree to which a respondent is still capable of clearly understanding his/her duties and responsibilities within the organization. This is shown not only by our findings on the effect of experiencing a higher-than-average level of change complexity (at least four change types) on role ambiguity, but also by subsequent regression results, which suggest that increasing change complexity to sometimes up to seven or eight simultaneously occurring change types will further increase experienced levels of role ambiguity. Accordingly, our findings support the argument that the effects of multiple, simultaneously introduced change types may accumulate (Moore et al., 2004; Wynen et al., 2020).

These results hold implications regarding both civil servant well-being and their functioning within public sector organizations. It has already been observed that ambiguity regarding the duties and responsibilities that should be performed can be a profoundly stressful experience for individuals (Allen et al., 2007; Hansen & Høst, 2012; Seo & Hill, 2005). Consequently, organizational-psychological research on the effects of reduced role clarity suggests that ambiguous work environments contribute to factors such as reduced job satisfaction and reduced performance (Abramis, 1994; Hansen & Høst, 2012; Tarrant & Sabo, 2010; Tubre & Collins, 2000). By introducing uncertainty regarding roles, complex change trajectories may therefore hamper civil servant well- being. This implies that addressing the consequences of complex change is a relevant area of attention for HRM, as it indicates organizational change should be paced carefully to safeguard employee wellbeing and allow for sufficient recuperation time in between changes (Wynen et al., 2020). Moreover, with extant research observing that role clarity is an important coping resource during organizational change processes, the finding that those very same processes could reduce role clarity implies a need for change management to reduce ambiguities where possible (Saksvik et al., 2007).

Our results also hold implications for discussions in public administration on policy alienation, a state of disassociation between a policy and the civil servant that implements it. Tummers et al. (2009) have already described how role conflict—a form of strain related to but analytically separate from role clarity

and role ambiguity—may result in policy alienation, as civil servants are increasingly confronted by opposing logics in their work environment. We speculate that, in addition to role conflict generated by opposing logics (a topic which was not studied here), a lack of clarity on the role that a civil servant should perform in his/her work and policy environment may similarly lead to policy alienation. As civil servants become unclear on the type of responsibilities they are expected to execute and the methods by which these tasks should be performed, they may not internalize the importance of certain roles. In turn, they may begin to feel increasingly disassociated from policy implementation processes and corresponding goals. Civil servants may wonder what societal and organizational meanings to assign to new policies and may lack the necessary clarity to exert influence over policies, generating the feeling that executing newly introduced but (from the perspective of civil servants) ill-defined roles is meaningless (Tummers, 2012). The resultant disassociation of civil servants from changing policies may in turn hamper the quality of services being provided at the organizational-level (Van Engen et al., 2016), implying that change—despite often being aimed at improving the organization's functioning—may paradoxically hinder performance in some cases (Allen et al., 2007; Wynen et al., 2017). Follow-up research should therefore investigate whether reduced role clarity generated by complex change may also affect components of the policy alienation framework, such as feelings of meaninglessness and powerlessness among affected civil servants.

This article makes a noteworthy methodological contribution by adopting a method of countering simultaneity not frequently used in public administration. Cross-sectional survey research is frequently confronted with simultaneity issues, situations in which the independent and the dependent influence one another, leading to overestimations of effect sizes when left uncorrected. In our case, such an effect could arise if change complexity is the result of organizational efforts to counter pre-existing role ambiguity within the organization, for instance in the context of prior underperformance of the organization. By using propensity score matching, it is possible to compare respondents that are similar on all variables but change complexity. By balancing covariates through this matching procedure, the impact that simultaneity has on our results could be mitigated (Thoemmes & Kim, 2011). As expected in the presence of simultaneity, our effect sizes drop some- what after implementing such corrections. Nevertheless, results remained significant and effect sizes remained relatively sizeable (experiencing more than four changes on average yields a reduction of 5percent in perceived role clarity). Finally, the applicability of our findings should not remain limited to the APS or Australia but can be extended to other settings as well. We have reason to assume that the underlying psychological mechanisms (uncertainty, stress accumulation) that lie at the basis of our findings are universal, and findings will therefore be similar across different organizations and countries that also experience the same condition of ongoing change.

Moreover, extant literature on the psychological mechanisms of stress also finds similar outcomes across different countries and cultures (e.g., Burke, 2010).

At the same time, it is necessary to point out remaining limitations. First, although we would argue that our item on role clarity closely aligns with the most used definition of role clarity (cfm. Rizzo et al., 1970), utilizing a multi-item, validated measure may be preferable in future studies. Concerning our measurement of change complexity, we should note that the 11 change categories defined by the APS may not be strictly mutually exclusive. What might be viewed as one major change will in reality often consist of several smaller changes, and might also be experienced by employees as such. This could have caused employees to count one change multiple times, if it consisted of several "subchanges" in their experience (for instance a merger could be counted as several different changes: structural change, functional change, change in physical workplace, etc.). However, this should not impact the validity of our measurement of change complexity: if employees perceived—and counted—one major change as several (smaller) changes, then this can be considered a direct reflection of their perception of change complexity which represents the main interest of this study. This approach also aligns with recent findings from Hollister and Watkins (2018), who note that there often exists "impact blindness" in organizations that are dealing with a multitude of change initiatives. They explain this can lead to "initiative overload," with management being unaware of all the initiatives that are under way and what their true impact is on the organization and its employees. This supports our focus on employee perceptions of change complexity, rather than objective counts of change events (as defined by management), as management's perception of change complexity might not as be as far-reaching and adequate as the perception of employees. Finally, when performing our analyses, we have accounted for the possibility that pre-existing problems can also lead to reduced role clarity. However, since we use cross-sectional data, we were not able to filter out endogeneity issues as would be possible with a panel structure.

We can distill several points for practitioners and areas for further study from our research. For practitioners, our results illustrate the value of maintaining clarity and preventing high change complexity within public organizations. Although introducing changes in areas such as leadership, working procedures, tasks, and IT-systems are likely inevitable, steps can be taken to ensure that civil servants remain capable of completing adjustment phases to new duties and responsibilities before introducing additional changes in other areas. Moreover, by designing change management in a way that clearly conveys where the organization is heading, it may be possible to mitigate role ambiguity among civil servants to at least some degree. At the same time, more research is necessary to distill how organizational change is related to role strain, including role clarity/role ambiguity. Although psychological research has for instance clearly demonstrated the potential negative effects of role

ambiguity, it remains unclear how organizational change precisely produces such ambiguities. With most role strain research being quantitative in nature, a relevant new step may be to add qualitative research on the exact causal path through which change generates ambiguity.

Article 2: Intense change – catalyzing or sabotaging organizational adaptability? Exploring the impact of intense change on decision-making in public organizations.[5]

Introduction

Contemporary public organizations are confronted with an increasingly complex operating context, characterized not only by large-scale societal and technological transformations, but also by a series of global crises. Especially over the past decade, governments had to respond swiftly to a variety of crises, ranging from environmental disasters, public safety threats (e.g. terrorist attacks) to the ongoing COVID-19 pandemic. Undeniably, these novel challenges as well as ongoing pressures to improve the efficiency of government and increased public scrutiny of government organizations increase the need for change within these organizations (Pollitt & Bouckaert, 2017). Consequently, many changes are inspired by a growing emphasis on organizational adaptability, and the pursuit of agile government that operates flexibly across silo's and can respond swiftly to constantly evolving citizen demands and environmental shifts (Mergel, Ganapati, & Whitford, 2021). While most researchers and practitioners concur that change is a necessary and inevitable aspect of organizational life, the increasing pace at which organizational change takes place provides cause for concern (Brunsson, 2009; Pollitt et al., 2017). Brunsson (2009) even notes that change has become a self-perpetuating 'routine' for many public organizations, with one change frequently leading to several others. Meanwhile, little is known about the impact of continuous change on organizations and their employees. Studies that started to examine the effects of repeated organizational change point at a range of potential side effects. They found that organizations with an intense history of change had to contend with higher absenteeism rates, a reduced capacity for innovation, and higher levels of role ambiguity, intent to quit, and health problems among employees (McMurray, 2007; Moore, Grunberg, & Greenberg, 2004; Wynen et al., 2017; 2019; 2020).

Interestingly, while public organizations are implementing ever more changes to increase organizational adaptability, the above findings indicate the opposite might be achieved. By creating periods of intense organizational change, it seems organizations might be undermining their adaptability rather than improving it. This also aligns with Brunsson's (2009) observation that changeful organizations (that change frequently) do not always equal changeable organizations (that are flexible and adaptive). To gain more insight into this potential paradox, this study intends to examine the effect of change intensity on

[5] This article is under review at Administration & Society.

organizational decision-making. Extant literature has already indicated that exposure to threatening events, such as ongoing change, can have a significant impact on decision-making (e.g. Argote et al., 1989; Gok & Atsan, 2016). However, literature proposes two competing theories that each predict opposite effects. On the one hand, threat-rigidity theory predicts managers will have the tendency to centralize decision-making in order to increase control and speed-up decision-making, with restricted information processing making them less susceptible to peripheral cues and alternative opinions (cf. Plotnick & Turoff, 2010; Staw et al., 1981). On the other hand, certain studies support a crisis flexibility model, which predicts decision-making will become more open and decentralized, as management tries to cope with the increased uncertainty (cf. Barnett & Pratt, 2000; Driskell & Salas, 1991; 't Hart et al., 1993).

Using a rigidity - flexibility framework, we test both theories and gather insight on their applicability in a context of intense organizational change. By focusing on the impact of change intensity -the occurrence of diverse types of organizational change in a short timeframe- this study aims to capture what cumulative impact multiple changes may have on decision-making. By taking into consideration the cumulated impact of previous changes, this study intends to add to the extant literature on change management and public administration and reveal practical implications for public sector practice. Data is collected through a survey held at a Belgian government agency, which has a recent history of intense organizational change. In the next section, the two competing theories of threat-rigidity vs. crisis flexibility are discussed. The Data & Measures section outlines the process of data collection and used measurements. Results are shown in the Methods & Results section, followed by a conclusion and discussion of results, and a review of implications for practice and opportunities for further research.

Theoretical framework

Extant literature offers competing perspectives on the impact of intense organizational change on decision-making. While certain studies indicate organizations will react rigidly and decision-making will become more centralized, other studies indicate organizations will react with increased flexibility and decision-making will become more decentralized. In the next section we build our theoretical framework incorporating both perspectives, arriving at two competing hypotheses.

Change intensity and centralization – A rigidity framework

The expectation that organizations will centralize their decision-making when confronted with uncertain, threatening situations is broadly supported in literature and has become a cornerstone of several theories ('t Hart et al., 1993). One of the most prominent ones concerns threat-rigidity theory, which states that

organizations and their employees will react with rigidity when confronted with events they experience as threatening (Staw et al., 1981). Staw et al. (1981: p. 502) define a threat as "an event that has imminent negative or damaging consequences for the entity". According to this definition, organizational change can thus be seen as a certain type of threat that can produce 'threat-rigidity effects', both at the organizational and the individual level. When employees are confronted with ongoing changes, or an accumulation of threats, we can expect threat-rigidity effects to develop even stronger. The perception of threat in a context of intense organizational change is also supported in literature. Several studies note that staff who are swamped by ongoing changes suffer from high levels of stress and anxiety, with employees facing uncertainty concerning key aspects of their job (such as their role, position and prospects in the changing organization) (e.g., Bordia et al., 2004; Fugate, Prussia, & Kinicki, 2012). Accordingly, in situations of intense ongoing change, change will be perceived as a threat, focusing on losses of both tangible and intangible resources that may not have taken place yet but that are anticipated (Bordia & Difonzo, 2013; Jones et al., 2008). Even when a loss has already occurred (such as the loss of co-workers), it can continue to instill a sense of threat (Jones et al., 2008). While we should note organizational change is not necessarily associated with a perception of threat but can also be perceived as challenging (i.e. exciting) by some (Lazarus et al., 1984), the latter is more likely when employees feel they have a certain degree of control over the change being implemented (Bordia et al., 2004; Lazarus et al., 1984). However, in a context of intense organizational change, when different types of change occur in a short period of time, we can argue a perception of threat will be more likely as it becomes increasingly difficult to assert control over a multitude of changes. In addition, the aggregate impact of the uncertainty and stress associated with different types of change might lead to even stronger perceptions of threat (cf. Dougall et al., 2000). Accordingly, threat-rigidity theory, which predicts employee – and organizational-level outcomes following a perception of threat, can provide a suitable starting point for deriving our first hypothesis.

At the individual level, the theory predicts that threatening events such as organizational change will lead to anxiety and uncertainty among managers as well as lower-level employees (Staw et al., 1981). While managers can face uncertainty about the impact and consequences of the change, employees at lower levels might fear the threatening event will have a negative impact on their own position and future prospects (Bordia et al., 2004). These threat-rigidity effects on individuals will in turn also lead to threat-rigidity effects at the organizational level. There, a perception of urgency will quickly develop among decision-makers who feel the need to avert or mitigate the threat as soon as possible (Plotnick & Turoff, 2010). Threat-rigidity theory predicts this will lead to an increased centralization of decision-making authorities, a stronger formalization of decision-making procedures, and the generation of a control and command culture (Muurlink et al., 2012; Plotnick & Turoff, 2010). Since the timeframes for implementing

organizational changes are often short and management needs to make decisions with a certain degree of urgency and uncertainty, there will be a tendency to centralize control in small groups in order to quickly and decisively address the threatening event (Lagadec, 1990; Muurlink et al., 2012; Staw et al., 1981). This will also lead to a restriction in information processing as attention fields are narrowed, the number of information channels are reduced and peripheral cues are ignored in favor of already held assumptions (Staw et al., 1981). This individual- level restriction in information processing may also mean that the organization as a whole becomes less capable of assimilating new information and unfamiliar cues.

In organizations characterized by high change intensity, each change may pose an increasing threat to the transparency and inclusiveness of decision-making processes. Additionally, as organizational decision-making becomes more centralized, the opportunities for lower-level employees to participate in project- or organization-level decision-making are further reduced (Hoskisson et al., 2016; Sarkar & Osiyevskyy, 2018; Staw et al., 1981). This in turn can reinforce threat-rigidity effects at the individual level and make employees withdraw even further from decision-making. Threat-rigidity effects at both the organizational and individual level can thus also affect and reinforce one another. In line with threat-rigidity theory, we formulate our first hypothesis:

H1: Increasing change intensity will lead to higher levels of perceived centralization of decision-making.

Finally, it is important to note that a rigidity response as predicted by threat-rigidity theory is not necessarily dysfunctional (cf. Deverell, 2010; Staw et al., 1981). Staw et al. (1981) note it can successfully reduce threats if the task or environment has not changed drastically. However, in an unstable and radically changing environment, they predict a rigid response will most likely be inadequate (Staw et al. 1981: 502–3). This argument is supported by Deverell (2010), who found evidence of threat-rigidity effects in public organizations confronted with two consecutive crisis events, but concluded these rigidity effects were not dysfunctional. Because there were no radical differences between the two events, a rigid response based on analogies from the previous crisis successfully reduced the threat and mitigated a similar crisis in the following year (Deverell, 2010).

Change intensity and decentralization – A flexibility framework

While the occurrence of a rigid centralization response in the face of threat has received considerable support in literature, closer examination of the literature reveals that alternative response patterns can emerge in government organizations confronted with threatening events (‘t Hart et al., 1993). A number of studies in the crisis management domain indicate that instead of a rigidity response, organizations may

also react with flexibility (Barnett & Pratt, 2000; Deverell, 2010; ‘t Hart et al., 1993). These insights have given rise to a new model of ‘crisis flexibility’, as a complement to threat-rigidity theory (Barnett & Pratt, 2000). Barnett et al., (2000) argue that emphasizing rigidity as the only type of response (whether functional or dysfunctional) to perceived threat, results in a perspective that is too narrow. Based on extensive analysis of case studies of corporate crises, they propose a crisis flexibility model whereby managers may use threat to generate flexibility and learning in response to uncertainty and crisis (Barnett & Pratt, 2000). Flexibility in turn is considered a key capacity for organizations to adapt to a changing environment. It entails an openness to new ideas, to new and varying information sources, and considering wide varieties of alternatives (Deverell, 2010). This openness also translates to more inclusive, decentralized processes of control and decision-making, in which managers become more receptive to input from lower-level employees or other organizational members or units (cf. Barnett & Pratt, 2000).

Several other studies also found evidence of such a flexibility response, noting an expansion of the bases of organizational control -rather than a restriction- in organizations that were exposed to crises situations (e.g., Driskell & Salas, 1991; ‘t Hart et al., 1993). ‘t Hart et al. (1993), for instance, found evidence of the occurrence of both formal and informal decentralization of decision-making in public organizations confronted with crisis. Informal decentralization consisted of a gradual relinquishing of control and decision-making power to lower hierarchical levels, while formal decentralization represented a more planned, formalized decentralization of decision-making authorities (‘t Hart et al., 1993). They found decentralized decision-making allowed for more collaboration, creativity and experimentation needed to manage the uncertain situation. In addition, experimental results from Driskell and Salas (1991) on group decision-making suggest that -under stress- group leaders become more receptive to the input and information provided by other group members.

While we should note that these insights stem from crisis management literature, they can provide new and insightful perspectives for the broader field of change management. As argued by Barnett and Pratt (2010), nearly all definitions and descriptions of ``crisis'' converge on the notion of ``threat''. They agree with Staw et al.'s (1981, p. 512) assertion that ``threat is probably the driving force behind most of the events that the term crisis attempts to explain''. While the terms change and crisis are two clearly distinct concepts, this indicates insights from crisis management literature can, to a considerable extent, also be applied to a wider range of threatening organizational events, including intense organizational change.

Importantly, ‘t Hart et al. (1993) distinguish between crises resulting from exogenous shocks, and crises that are self-imposed or even “willful” (1993). Similarly, Barnett & Pratt (2000) argue that organizations can also undergo “autogenic'' crises, which they define as self-induced, anticipatory change in response

to potential adversity in the future. They point out several organizations are dealing with unparalleled, rapid, environmental change in an anticipatory manner, leading to an increasing number of anticipatory changes (Barnett & Pratt, 2000). This further warrants our focus on change intensity, as it accounts for situations in which different changes occur in a short period of time. While the perception of threat may be less severe in cases of self-induced, autogenic crisis, Barnett et al. (2000) argue there will still be a perception of latent threat. They suggest it is the latent nature of the threat involved in an autogenic crisis that provides an organization with the opportunity for responding flexibly rather than rigidly. The perception of latent threats will still generate stress and arousal, but at functional levels so that they may facilitate organizational adaptation and longer-term change (Barnett & Pratt, 2000).

The above-mentioned findings show that – under conditions of stress and uncertainty – centralization is not necessarily the default response (Barnett & Pratt, 2000; Driskell et al., 1991; 't Hart et al., 1993). Each of these studies indicate that when confronted with a threatening situation, organizations may also become more flexible, reverting to more open forms of communication and information processing, and more decentralized decision-making. Therefore, in line with these findings supporting a crisis flexibility model, we formulate a second, alternative hypothesis:

H2: Increasing change intensity will lead to lower levels of perceived centralization of decision-making.

Data and measures

Data collection

For this research project, data was collected through a large-scale survey held at a Belgian government agency. They are tasked with direct service provision and policy development in the welfare sector. At the time of the survey, the agency was in the middle of a complex merger process, consisting of various types of changes affecting the entire organization. Given this context, the agency provided a prime setting for this particular study. The survey ran from March until May 2021 and was distributed among the entire organization, consisting of over 1000 employees who all received a personal email invitation to partake in the survey. In the agency 55,08% of employees work as a civil servant (or civil servant on a trial basis) and 45,02% works on a contractual basis (or as a contractual on a trial basis). We should note that in the organization's workforce there is an uneven representation of gender, with women making up 77,35% of the population. The employee base is also relatively young, with most employees being aged between 25 and 45 (61,76%). The average tenure of employees is also relatively low, with 42,29% of employees having a tenure of less than 5 years. Finally, the majority of employees hold a high classification level (83,03% with the highest levels A or B), meaning the organization's workforce is relatively highly educated. The

survey not only provides us with information on the organizational level but also allows us to analyze data narrowed down to the team cluster-level. More specifically, a total of 17 team clusters or work units were identified.

A sample was retrieved of 1186 employees. Although this sample proved to be representative regarding base of employment ($\chi^2(3)=0.19$, p-value=.9785) and gender ($\chi^2(1)=3.25$, p-value=.0716), there are problems with respect to age ($\chi^2(8)=31.27$, p-value=.000), tenure ($\chi^2(7)=16.53$, p-value=.021) and classification level ($\chi^2(3)=24.97$, p-value=.000). To overcome this issue, weighted analyses will be presented. For the weighted analyses, raking adjustments have been calculated to develop sampling weights. Using raking allows for multiple stratification dimensions, in our case the weights account for age, tenure, classification level, employment base and gender.

Measuring change intensity

Change intensity is defined as 'the occurrence of diverse types of organizational change in a short timeframe'. This is a self-developed measure. Previous studies often resorted to terms like 'reform sequences' or 'repeated change', referring to successive changes of a similar nature, such as repeated structural reforms or repeated lay-offs (Moore et al., 2004; Wynen et al., 2017; 2019). However, the aim of this study is to capture the effects of different types of change that occur in short period of time. To this end, the concept of 'change intensity' was developed. Respondents were presented with seven change types, for which they could indicate whether they had experienced this particular change in the past three years. The change types included; change in physical workplace, in job function, in job content and procedures, in team composition, in departmental structure, IT-related changes as well as a category 'other' (which could be specified in a subsequent question). These change types were identified in close cooperation with the organization's management. Through extensive discussions with agency executives and subsequent pilot surveys among employees, it was possible to identify the different types of changes employees could have experienced in the past three years, ensuring each of these were relevant for the organization. In line with our definition of change intensity, the measure of change intensity consists of the summative score of the number of different change types experienced by employees (with values ranging from 0 to 7).

Measuring centralization of decision-making: job and team autonomy

Literature indicates that decision-making and the degree to which it is centralized consists of two dimensions (Lambert et al., 2006; Wright et al., 1997). First, it can point at the degree of input employees have in strategic decision-making, in shaping and guiding the future of the organization (Lambert et al.,

2006). Second, it can point at the extent to which an employee has input and control over the tasks and priorities of his/her job, frequently referred to as the degree of job-autonomy (Hackman & Oldham, 1975; Karasek, 1998; Lambert et al., 2006;). In our study, focus will be on the latter dimension of decision-making. Specifically, we will look at the impact of intense change on perceived job-autonomy, as well its impact on perceived team-autonomy. While job-autonomy refers to discretion in the planning and execution of individual tasks (Hackman & Oldham, 1975; Karasek, 1998), team autonomy refers to the same attributes in the tasks of a team (Cordery et al., 1991; Hackman, 1987; Kirkman and Rosen, 1999; Langfred, 2000). While these are two distinct constructs, perceived team-autonomy can be considered the team-level analogy of perceived job-autonomy (van Mierlo et al., 2006). Organizations – both private and public - increasingly turn towards team-based work structures in which team units are granted a considerable amount of autonomy in organizing their work, including the organization that is the subject of this study. Therefore, it seems relevant and important to include team-level autonomy in our study (cf. van Mierlo et al., 2007). The degree of autonomy employees perceive –both at the individual and the team-level- can be considered a direct reflection of the extent to which decision authorities are centralized or decentralized: A high degree of both levels of autonomy represents a decentralized organization, while low levels of both represent a highly centralized organization (cf. Lambert et al., 2006). In a classic government bureaucracy, for instance, grass-roots decision-making on tasks and job schedules are kept to a minimum in a top-down effort to retain efficiency. Under such centralized work circumstances, we would expect employees to experience little autonomy on both the individual and the team level.

Both measures of autonomy consist of indexes (perceived job-autonomy, Cronbach's alpha=0.659; perceived team-autonomy, Cronbach's alpha=0.691). Job-autonomy was constructed using three items adapted from Breaugh's work autonomy scale (1985) (I determine my own work pace, I plan my own work, I determine how I perform my work), with answer categories ranging from 1 – Never to 5 – Always. The index for team-autonomy was constructed using four items, asking about perceived team-autonomy for four different team tasks; planning of work, distribution of work, managing team resources, and providing feedback. Three answer options were provided, ranging from 1 – decided entirely by the team manager, 2 – decided partly by the team manager and partly by the team members themselves, and 3 – decided entirely by team members themselves. Additional factor analysis (available in appendix) shows that for both concepts, all items load on the same factor (eigenvalue > 1). In the subsequent analyses we make use of the summative score of the items for both index variables.

The survey also enables us to control for individual-level variables that can affect the relationship between change intensity and perceived job- and team-autonomy. Individual characteristics that are included as

controls are gender, employee statute (employment base), age, having a managerial function or not, being part of a team with shared leadership, and tenure. Descriptive statistics are presented in Table 2.1.

Table 2.1. Descriptive Statistics

N	1186
Dependents	
Job-autonomy, mean (SD)	11.2 (1.8)
Team-autonomy, mean (SD)	9.0 (2.0)
Independents	
Change intensity, mean (SD)	4.7 (1.5)
Gender	
Female	941 (79.3%)
Male	245 (20.7%)
Tenure	
Less than 5 years	464 (39.1%)
Between 5 and 10 years	140 (11.8%)
Between 10 and 15 years	187 (15.8%)
Between 15 and 20 years	168 (14.2%)
Between 20 and 25 years	91 (7.7%)
Between 25 and 30 years	74 (6.2%)
Between 30 and 35 years	48 (4.0%)
Over 35 years	14 (1.2%)
Statute	
Civil servant	634 (53.5%)
Civil servant on probation	11 (0.9%)
Contractual	539 (45.4%)
Contractual on probation	2 (0.2%)
Age	
Younger than 25	27 (2.3%)
Between 25 and 30	170 (14.3%)
Between 30 and 35	180 (15.2%)
Between 35 and 40	197 (16.6%)
Between 40 and 45	206 (17.4%)
Between 45 and 50	125 (10.5%)
Between 50 and 55	117 (9.9%)
Between 55 and 60	118 (9.9%)
Over 60	46 (3.9%)
Managerial position	
Managerial position	120 (10.1%)
No managerial position	1066 (89.9%)
Shared leadership	
Team with supervisor	568 (47.9%)
Team without supervisor	618 (52.1%)
Month	
March	708 (59.7%)
April	284 (23.9%)
May	194 (16.4%)

Methods and results

To determine the effect of change intensity on centralization of decision-making, we perform two separate OLS regression analyses to determine the effect on both our indicator variables: perceived job-autonomy and perceived team-autonomy. Table 2.2 shows the weighted results for both regressions (unweighted results can be consulted in the appendix, Table 5).

Table 2.2. Regression output (weighted) for dependents job-autonomy and team-autonomy

Variables	Job-autonomy	Team-autonomy
Change intensity	-0.166**	0.0980*
	(0.0433)	(0.0435)
Gender	-0.0817	-0.204
	(0.147)	(0.139)
Tenure (<5 years = ref cat.)		
5 - 10 jaar	-0.0585	0.127
	(0.217)	(0.224)
10 - 15 jaar	0.143	0.0226
	(0.205)	(0.204)
15 - 20 jaar	0.00443	0.308
	(0.230)	(0.205)
20 - 25 jaar	-0.293	0.454*
	(0.280)	(0.225)
25 – 30 jaar	0.00861	-0.0104
	(0.269)	(0.299)
30 – 35 jaar	0.410	0.575
	(0.312)	(0.360)
> 35 jaar	0.895	-0.200
	(0.662)	(0.497)
Statute (civil servant = ref cat.)		
civil servant on probation	-2.118	-0.274
	(1.551)	(1.194)
contractual	-0.145	0.350*
	(0.190)	(0.165)
contractual on probation	-2.064*	0.113
	(0.865)	(0.252)
Age	0.0154	-0.0146
	(0.0319)	(0.0348)
Managerial position	-0.472*	-0.116
	(0.209)	(0.216)
Shared leadership	0.541**	2.304**
	(0.136)	(0.155)
Month (March = ref cat.)		
April	0.217	0.142
	(0.151)	(0.144)
May	0.167	-0.0709
	(0.167)	(0.163)
Constant	12.04**	5.295**
	(0.538)	(0.550)
Observations	1,186	1,186
R-squared	0.059	0.375

Standard errors in parentheses
** p<0.01, * p<0.05

For both job-autonomy and team-autonomy, the overall regression is statistically significant (job-autonomy: R2 = 0.06, F(17, 1169) = 2.48, p = .001; team-autonomy: R2 = 0.38, F(17, 1169) = 38.84, p = < .000). When studying the results, we find that change intensity significantly predicted job-autonomy (β = -.166, p = 0.000), with change intensity having a significant negative effect on job-autonomy. These results support H1 which predicts change intensity will lead to higher levels of perceived centralization of decision-making (in this case a lower degree of perceived job-autonomy). Change intensity also significantly predicted team-autonomy (β = 0.098, p = 0.025), however only below the 5% confidence level. Moreover, the effect of change intensity on team-autonomy (albeit small) appears to be positive, indicating H1 is not supported for team-autonomy. At the level of the team, we rather find support for our alternative hypothesis (H2) which predicts change intensity will lead to lower levels of perceived centralization of decision-making (in this case a higher degree of team-autonomy). It could be argued this is because some employees (52.1%) have already started working in teams with shared leadership, which was accompanied by changes facilitating team-autonomy. To control for this issue we conducted an additional regression for team-autonomy, disaggregated by team type (shared leadership or not). The results (available in the appendix, Table 6) show there is no significant impact of team type on team-autonomy, allowing us to conclude that the existence of teams with shared leadership did not distort our final results.

Our indicator variables thus each provide support for a different theory: the analysis of the impact on job-autonomy supports the rigidity hypothesis (H1), while the analysis of the impact on team-autonomy supports a flexibility hypothesis (H2). In the concluding section, we will explore possible explanations for these seemingly contradictory findings.

When looking at the control variables, it becomes clear that whether one works in a team with shared leadership significantly impacts perceptions of both job- and team-autonomy. Those who work in a shared leadership team (without formal supervisor) report significantly higher levels of both types of autonomy. The statute an employee holds also seems to matter, with those working on a contractual base reporting higher levels of team-autonomy compared to statutory civil servants, while contractuals who still work on probation report significantly lower levels of job-autonomy. This finding is not surprising since employees who are on probation are usually monitored closely and will likely perceive less job-autonomy. Furthermore, employees with a tenure of 20-25 years seem to experience significantly more team-autonomy compared to their colleagues with a tenure of less than five years. Respondents who hold a managerial position also reported more job-autonomy compared to those without a managerial role.

Discussion and conclusions

The increasing pace at which public organizations are undergoing change has raised concerns among practitioners as well as researchers (Brunsson, 2009; Pollitt et al., 2017). Meanwhile, little is known about the precise effects of intense organizational change on key organizational factors such as decision-making. Consequently, this study has examined the impact of change intensity – the occurrence of diverse types of change in a short timeframe - on organizational decision-making. Since findings from extant research point at different directions, we examined two competing theories proposed by literature; threat-rigidity theory vs. crisis flexibility theory (Barnett & Pratt, 2000; Staw et al., 1981). Using a rigidity vs. flexibility framework, we have formulated two competing hypotheses: one predicting increased centralization of decision-making (i.e. rigidity) and one predicting decreased centralization of decision-making (i.e. flexibility) in response to change intensity. Literature typically identifies two dimensions in the degree of centralized decision-making: job-autonomy and participation in strategic decision-making. For this study however, the choice was made to focus on the autonomy dimension and to expand on this by including data on team-level autonomy. Given the rise of autonomous work teams in contemporary organizations it seems important to gain an understanding of the effects on both levels of autonomy. Hence, the degree of centralization of decision-making was measured with two indicator variables: perceived job-autonomy and perceived team-autonomy. High levels of both indicate decentralized decision-making, while low levels of both indicate more centralized decision-making (Lambert et al., 2006).

Both our hypotheses were partly confirmed, with each indicator variable painting a different picture. We found change intensity had a significant negative impact on perceived levels of job-autonomy. This finding supports threat-rigidity theory (cf. Staw et al. 1981), which predicts that in response to a threatening situation managers will constrict control and centralize decision-making to quickly address the threat, leaving less room for employees to participate in decision-making. The finding that perceived job-autonomy is negatively impacted by increasing change intensity also holds important implications for practitioners, particularly those responsible for implementing change. While a rigidity response is not necessarily dysfunctional when decisive action needs to be taken, it might be inadequate in an unstable and radically changing environment, in which organizations are confronted with different types of threats (cf. Deverell, 2010; Dougall et al., 2000; Staw et al. 1981). Accordingly, organizations that are confronted with a period of high change intensity might consider pacing organizational changes whenever possible, to prevent that the threat of ongoing change evokes a maladaptive rigidity response. Moreover, job-autonomy is considered a key resource for employees (Bakker & Demerouti, 2007), and the absence of it can have a detrimental impact on overall employee satisfaction and organizational commitment (cf. Balfour & Wechsler, 1996; Steijn & Leisink, 2006; Vigan & Giauque, 2018). Furthermore, as noted by Strehl

(1993), civil servants have become increasingly critical organizational members, demanding more participation in decision-making procedures and being less inclined to accept traditional top-down management approaches. This further indicates potential negative side effects of a rigidity response should be carefully monitored in public sector organizations.

Our finding in support of threat-rigidity theory also aligns to some extent with recent findings from van der Voet and Lems (2022), who found evidence of reduced generation of creative policy solutions when civil servants were confronted with the threatening situation of negative performance feedback. Consequently, they also conclude that public organizations' capacity to continuously adapt in difficult circumstances is limited due to the occurrence of threat-rigidity effects (van der Voet & Lems, 2022). Our results for team-autonomy, on the other hand, show a different picture: perceived team-autonomy was slightly positively impacted by change intensity (at 5% significance level), supporting our competing hypothesis of a flexibility response (i.e. decentralization). This indicates that -on the team-level- employees perceived more autonomy as change intensity increased. These results seem to support a crisis flexibility model, in which management is expected to become more open to input from other employees, making decision-making more inclusive and decentralized when confronted with a threatening situation (Barnett & Pratt, 2000; 't Hart et al., 1993).

Hence, our findings point in opposite directions: we find a reduction of perceived autonomy at the individual level, indicating a rigidity response, while on the team-level employees reported more team-autonomy as they experienced more intense organizational change, indicating a flexibility response. Here, threat-rigidity effects unfolding at the team-level could provide a possible explanation: The implementation of organizational changes often brings along an increased workload and responsibilities for employees, which can be perceived as threatening by certain team members. This in turn could lead to increased centralization of decision-making within the team, whereby decision powers are (to an extent) shifted one level up from the individual employee towards that of the team (cf. our results indicating increased team-autonomy). This is also in line with earlier findings from Brouillette and Quarantelli (1971). They found that work units of public organizations became more autonomous during a period of threat, and decisions were made without consultation with higher officials. However, within each of these autonomous units an informal 'administrative core' emerged to make decisions, suggesting increased centralization within each of the units. Such dynamics may explain why employees in our study perceived less individual autonomy, while perceiving their team unit had more autonomy and decision powers.

Accounting for the intensity of change, this study adds to the extant literature -which traditionally studied change as single, isolated events- by capturing what cumulative impact different changes may have on organizations and their employees. The results indicate that these aggregate effects do matter, as change intensity had a significant impact on both job- and team-autonomy. In addition, it has added to insights on the applicability of both threat-rigidity theory and crisis flexibility theory, in a context of intense organizational change. Interestingly, while change is often implemented in the pursuit of a more agile organization, our results seem to support a potential paradox regarding intense change and its impact on organizational adaptability. Decentralized decision-making, with extensive collaboration across organizational units and decisions being driven bottom-up, is considered a key characteristic of agile and flexible organizations (Haraff et al., 2015; Janssen & van der Voort, 2016, Mergel et al., 2021). In this sense, 'agile' turns traditional organizational principles of the bureaucracy upside down, since it goes against traditional control and command culture and requires great flexibility in organizational procedures and principles (including decision-making) (Mergel et al., 2021). However, since we found (at least partial) support for the rigidity thesis, pointing at increased rigidity rather than flexibility, we must consider that under conditions of intense organizational change, change might undermine organizational adaptability rather than improve it.

Finally, this study also deals with certain limitations. Since our data and findings originate from one single organization, this may limit generalizability. Other organizations could have different internal dynamics, structures, or organizational cultures. These factors could influence the results when the study would be replicated in a different organization. Second, the COVID-19 pandemic and related measures that were present during the time of data collection could also pose a threat to the external validity of our findings. Repeating the study in another organization or different country, where COVID-19 measures in the professional sphere were different, could provide different results. Furthermore, since the data is cross-sectional it does not allow us to draw causal inferences. Although it is probable that the threat posed by intense organizational change has an impact on organizational decision-making, longitudinal studies could provide more insight into the causal direction of the relationship between both variables. It also entails that we cannot exclude issues of endogeneity, in which an unexplored factor impacts both out dependent and independent variables. Finally, since both the dependent and independent variables are measured using the same survey, the existence of common method bias cannot be ruled out.

Article 3: Does organizational change trigger civil servant proactivity? The impact of past changes experienced.[6]

Introduction

Civil servants are confronted with rapid changes in their workplace, being asked to work in new ways, using new tools and technologies, while exercising more autonomy and responsibility (Vivona et al. 2020; Demmke, 2019; Anderson-Connolly et al., 2002). Consequently, they are expected to have a flexible, active work attitude and to approach occurring problems in a proactive way (Demmke, 2019; Kruyen & van Genugten, 2020). Proactive work behavior is defined as self-directed and future-focused action to bring about change to one's work situation or within oneself (Grant & Ashford, 2008). While workplace changes are often introduced with the aim to increase efficiency, in practice, they do not always have the envisioned outcome (Van der Voet & Vermeeren, 2017; Wynen et al., 2017). Since prior research found that the success of public sector change is largely determined by the response of civil servants, it appears they might not respond to these changes quite as expected (Ahmad & Cheng 2018; Van der Voet, Kuipers, & Groeneveld, 2016). This raises the question if the proactivity that is demanded from civil servants to successfully deal with ongoing changes, is, paradoxically, undermined by those same change events.

Organizational change is typically accompanied with a significant increase in job stress, brought on by high job demands, role conflicts, and uncertainty (Fugate et al., 2012; Smollan, 2015; Bordia et al., 2004). This holds particularly true in the public sector, where changes are introduced at an increasingly rapid pace and opportunities to recover in between change events become increasingly scarce (Brunsson, 2009). Stress, in turn, can trigger various coping responses in employees, as they try to manage the challenging situation (Lazarus & Folkman, 1984). Proactivity can be considered a problem-oriented, particularly active type of coping behavior (Parker et al., 2006, Lazarus & Folkman, 1984). Several studies found that job stressors can trigger employees to engage in proactive behavior (Sonnentag & Spychala, 2012; Fay & Sonnentag, 2002; Ohly et al., 2006), although some important limitations seem to exist. While, in the short run, job stressors such as time pressure can motivate proactive behavior, conservation of resources (COR) theory (Hobfoll, 1989; 2001) suggests that employees who faced repeated stressors over an extended period of time will be depleted from resources, making proactive behaviors increasingly difficult (Bindl & Parker, 2011). Accordingly, having experienced frequent changes over the past years might be such a factor that impacts employee resources and, ultimately, their ability to behave proactively. This suggests

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that adopting a more historical, process-based view of change - considering civil servants' past change experiences- might reveal effects that would otherwise be missed.

We therefore examine the effect of organizational change on civil servant proactivity, while taking into account the impact of civil servants' past change experiences. Based on insights from COR-theory and stress and coping literature, we propose that civil servants who already experienced many changes in the past will be less proactive in response to new changes compared to their colleagues who only experienced few. We test this proposition using first-difference analyses, with longitudinal data obtained from two survey waves in a Belgian government agency. Using data from both survey waves reduces issues of endogeneity, providing greater leverage in distinguishing cause and effect (Stock & Watson, 2020). By considering the potential impact of past change experiences and associated stress, this study responds to calls to make research on public sector change more historical, contextual and processual (Kuipers et al., 2014; Ahmad et al., 2021). Finally, our study also contributes to the public administration literature by using a micro-level perspective, focusing on temporal dynamics in civil servant behavior. As noted by Ahmad et al. "considerations of such micro-level processes in public sector organizations undergoing change remain scarce" (2021: 2). Moreover, it is important to understand effects of change unfolding at the individual level, as these will eventually manifest at the organizational level and impact overall adaptability. Borins (2001), for instance, found that -at the individual level- civil servants that creatively solve problems in a proactive manner and deal with problems before they escalate to crisis proportions are key to public sector innovation.

Next, we present our theoretical framework drawing from two stressor-strain theories: Lazarus and Folkman's stress and coping theory as well as COR theory. The Data & Measures section outlines the process of data collection and used measurements. Results are presented in the Methods & Results section, followed by concluding remarks and a review of implications for practice.

Theoretical framework

Extant research on organizational change has found that employees usually perceive changes in their workplace as being stressful events (Cullen-Lester et al., 2019). This is partly due to the anticipated or actual negative outcomes of change (such as reduced autonomy or loss of coworkers), and partly due to the transition process which may create extra work and produce considerable uncertainty (Smollan, 2015, Fugate et al., 2012). This uncertainty is likely to lead to elevated stress levels in employees (DiFonzo & Bordia, 2002). Several longitudinal studies have demonstrated that the effects of frequent change may persist over time, contributing to a chronically stressful work environment (Moore, Grunberg, &

Greenberg, 2004; Rafferty & Griffin, 2006; Smollan, 2015). Whenever employees experience stress, they will look for ways to manage the stressful situation, which is referred to as coping. Extant literature shows that employees may resort to various strategies to cope with a changing work environment, some considered more desirable than others (Oreg et al., 2011; Wynen et al., 2022). In this study, we focus on proactive work behavior as a possible coping strategy.

Although the term proactivity has been applied to a multitude of organizational behaviors across different domains, research has identified two core aspects that define any particular behavior as proactive (Cangiano & Parker, 2016). First, proactive behavior is anticipatory and involves thinking ahead about a situation to prevent problems or make the most of future opportunities. Second, proactivity involves taking control of a (anticipated) situation by initiating change (Parker et al., 2006). Due to its broad definition, proactive work behavior to some extent overlaps with other constructs such as intrapreneurship (Rigtering & Weitzel, 2013) and individual entrepreneurial orientation (Bolton & Lane, 2012). While proactive behavior indeed makes up a key dimension of these constructs (Rigtering & Weitzel, 2013; Bolton & Lane, 2012), a key difference lies in their focus and scope. Intrapreneurship specifically emphasizes entrepreneurial employee behavior that targets innovation and organizational growth (Gawke, Gorgievski, & Bakker, 2019). On the other hand, proactive work behavior refers to employees' self-initiated actions aimed at improving their work without necessarily having a strategic, entrepreneurial focus (cf. Grant & Ashford, 2008). Proactivity also shares some common ground with organizational citizenship behavior (Cangiano & Parker, 2016). However, this remains distinct from proactivity in that it is not necessarily anticipatory or future-focused (Cangiano & Parker, 2016). Since this study offers a first exploration of the impact of past change experiences on civil servant proactive behaviors, it examines the broader concept of proactive work behavior rather than the more specific constructs mentioned above.

In the next section -drawing from Lazarus and Folkman's transactional theory of stress and coping (1984)- we explain how behaving proactively may serve as an important, problem-focused coping strategy for employees to deal with the stress of organizational changes.

Proactivity as a coping response

According to Lazarus and Folkman's (1984) transactional model of stress and coping, individuals will experience stress when they perceive their environment as being challenging, threatening, or harmful. This initial evaluation of the environment is referred to as primary appraisal (Lazarus & Folkman's, 1984). Whereas appraisals of threat or harm are characterized by negative emotions, occurring when individuals

believe an event has or will damage them, appraisals of challenge are characterized by positive emotions, occurring when individuals have sufficient coping resources and believe the situation holds the potential for personal rewards or growth (Hobfoll, 1989; Lazarus, 1991). Hence, in a context of organizational change, employees will experience stress if they appraise these changes as being either challenging, threatening, or harmful. A perception of harm, for instance, can stem from the loss of valued colleagues in the event of restructurings or downsizings, or the loss of highly rated job aspects earned over time, such as power or prestige (Robinson & Griffiths, 2005; Jimmieson et al., 2004). When such events have not yet taken place but are anticipated by employees, they will contribute to perceptions of threat (cf. Lazarus & Folkman, 1984). This sense of threat can linger on until long after any actual loss has occurred (Wynen et al., 2022). Furthermore, changes may also be appraised as challenging by employees if they believe the change presents interesting opportunities for personal growth.

Lazarus and Folkman (1984) explain that this primary appraisal of an event is followed by a secondary appraisal, in which individuals consider the availability and likely success of different coping strategies to resolve the perceived challenge, threat or harm. Lazarus et al. (1984) argue that the amount of control individuals perceive and the resources they have available will largely determine what type of coping behavior individuals resort to (Lazarus & Folkman, 1984; Lazarus, 1991). Specifically, Lazarus et al. (1984) distinguish between two main types of coping strategies: problem-focused vs. emotion-focused coping. Problem-focused coping is aimed at addressing the problem that is causing the distress, while emotion-focused coping is aimed at regulating one's emotional response to the problem instead (Lazarus et al., 1984; Callan, Terry, & Schweitzer, 1994). Emotion-focused forms of coping will consist of strategies to control the emotional impact of stressful events such as feelings of fear, anger, and sadness. This is most likely to occur when individuals perceive that nothing can be done to resolve the problem itself (Lazarus et al., 1984). Accordingly, in a context of organizational change, employees will likely resort to emotion-focused coping when they feel they have no control over the changes being implemented nor possess the needed resources to affect the outcomes (Wynen et al., 2022). When they perceive that they have the necessary resources to manage the challenges accompanying organizational change, employees will be more inclined to resort to problem-focused coping strategies (Lazarus et al., 1984; Terry, Callan, & Sartori, 1996). In such circumstances, information seeking as well as making plans of action have been identified as key problem-focused strategies for dealing with change-related stress (Callan, 1993; Robinson & Griffiths, 2005)

Based on these insights, proactive work behavior can serve as a problem-focused coping strategy employees may resort to when they are confronted with organizational change. Several studies indicate that job stressors such as time pressure and uncertainty can trigger employees to engage in proactive

behavior (Sonnentag & Spychala, 2012; Fay & Sonnentag, 2002; Ohly et al., 2006). Given that uncertainty, reduced job control and increased work pressure are key factors that make change stressful (Bordia et al., 2004; Seo & Hill, 2005), employees may thus address these issues by behaving (more) proactively. By adjusting their behavior, taking initiative, and voicing their concerns, employees can attempt to regain their sense of control and reduce feelings of uncertainty (Crant, 2000; Grant & Ashford, 2008). They can suggest ideas to address not only current but also anticipated issues, thereby reducing their levels of stress and potentially mitigating the future occurrence of change-related stress (cf. Aspinwall & Taylor, 1997). Hence, we arrive at our first hypothesis:

H1: Employees who experienced new changes in the last year will respond by behaving more proactively.

Proactivity in a context of repeated organizational change – a COR Perspective

In the previous section we discussed proactivity as a problem-focused coping strategy employees can resort to in response to organizational change (cf. Lazarus & Folkman, 1984). When employees are confronted with a changing work environment, they can increase their proactive actions in an attempt to address aspects of change that are causing them distress (i.e. reduced job control, autonomy). Proactivity, however, has been described as a particularly resource-intensive behavior. Due to its self-initiated, self-directed and anticipatory nature, it usually requires considerable energy, time and attention for planning and enacting (Cangiano, Parker, & Ouyang, 2021). In the next section, using Hobfoll's (1989) Conservation of Resources (COR) theory, we build our argument that proactivity as a coping response will become increasingly unlikely in employees who already experienced many changes in past. While both are stressor-strain theories, COR theory presents an alternative (but complementary) view on the stress process as described by Lazarus and Folkman: it posits that the (actual or anticipated) loss of resources (considered 'objective elements') will be the main cause of stress in employees, rather than their personal appraisal of a situation (Van Doninck et al., 2022).

Hobfoll's COR-theory is one of the most widely cited theories in organizational psychology and organizational behavior and has also gained increasing attention in the public management literature (Jin, McDonald, & Park, 2018; Borst et. al, 2019; Giauque & Weissbrodt, 2021). It centers on the proposition that individuals are motivated to both protect their current resources and acquire new resources (Hobfoll, 1989). Hobfoll (1989) has defined resources as any attributes – tangible or intangible- that are highly valued by individuals. In the context of work, resources can consist of personal characteristics (e.g. self-efficacy, energy), job characteristics (e.g. autonomy), professional skills and social conditions (e.g. social support, esteem). A first principle of COR theory is that resource loss is disproportionately more salient

than resource gain (cf. 'primacy of loss principle'). With this principle, Hobfoll posits that resource loss will have a more powerful impact on individuals than resource gain, and that this impact will also be felt much faster. The second key principle of COR theory is that people must invest resources in order to protect against resource loss, recover from losses, and gain additional resources (cf. 'resource investment principle') (Hobfoll, 1989; Hobfoll et al., 2018). In line with the latter principle, employees investing resources in proactive behavior might be attempting to protect against (further) resource loss or trying to gain additional resources. In times of organizational change, employees might behave more proactively to gain -or regain- resources that are frequently comprised during change, such as a sense of control, autonomy, feelings of mastery, etc. (Robinson et al., 2005).

However, Hobfoll (2001) also explains that as individuals lose resources, investment becomes increasingly difficult, potentially leading to a so-called 'resource loss spiral'. Especially when resources are already low, individuals will focus on protecting their remaining resources by spending less energy in the workplace, rather than attempting to gain new resources (cf. the primacy of loss principle) (Hobfoll, 1989; 2001; Halbesleben & Bowler, 2007). Prior studies already indicated that frequent organizational change places heavy resource demands on employees, as they need to manage change not only from a practical point of view (e.g. increased workload), but also from a psychological point of view, given that change can bring along considerable uncertainties concerning key aspects of an employee's job (Bordia et al., 2004; Jimmieson et al., 2004). Accordingly, employees experiencing frequent organizational change are increasingly likely to suffer from resource depletion, with resources being chronically low (Bernerth et al., 2011; Rafferty & Griffin, 2006; Bindl & Parker, 2011). As argued by Bernerth et al. (2011), employees can only handle so much change and disruption before their ability to cope becomes overwhelmed. Moreover, Smollan (2015) found that even when a change has been implemented, respondents still report to suffer from inadequate resources, and the feeling of "needing to do more with less". This indicates that stress and loss of resources does not only occur during the implementation phase of organizational change but can persist long after the formal completion of a particular change event. It also provides further support for the assumption that when change happens frequently, resource depletion becomes increasingly likely. In addition, it points at the need to examine the aggregated impact of changes experienced over the past years rather than focus on the effects of one single change event. Moreover, extant literature indicates that resources are finite, and individuals are forced to make allocation decisions regarding the resources they have (Halbesleben et al., 2014). Hence, in line with COR's primacy of loss principle, we can assume that the resource depletion resulting from repeated organizational change will make it increasingly difficult for employees to free up the resources that are needed to behave proactively. In such conditions, employees, will be less inclined to try and gain additional resources by investing in proactivity, which is not only a resource-intensive but also a risky behavior, as outcomes are not always beneficial to the

performer (Cangiano & Parker, 2016; Wu et al., 2018). Instead, employees will rather turn towards more defensive strategies aimed at preventing (further) resource loss (cf. Hobfoll et al., 2018).

While we previously framed proactivity as a problem-focused coping strategy employees can resort to in response to organizational change (cf. Lazarus & Folkman, 1984), insights from COR theory call for a more nuanced view. Based on the theory's key principles, we should consider that when employees already faced many changes in the past, proactivity as a coping response will become less likely. Accordingly, we arrive at our second hypothesis:

H2: Employees who experienced many changes in the past will be less proactive in response to new changes compared to their colleagues who experienced few changes in the past.

Data and measures

Data collection

The data stem from a large-scale survey held at a Belgian government agency, concerned with policy development and service delivery in the welfare sector. The agency executes a diverse set of tasks and employs different types of profiles, ranging from street-level bureaucrats and administrative personnel to policy officers. The data were collected over two points in time, with a first survey wave conducted in 2021 and the second wave conducted 11 months later in 2022. The agency under study underwent a recent merger. The operational implementation of the merger was still ongoing at the time of the two surveys. The study targeted the entire organization, consisting of a total of around 3000 employees who all received a personal email invitation to participate.

Table 3.1. Descriptive statistics

	Overall sample	Past changes: Few	Past changes: Many
N	1420	368	1052
Dependent			
Proactivity, mean (SD)	3.3 (0.6)	3.2 (0.5)	3.3 (0.6)
Independents			
New changes, mean (SD)	5.7 (1.0)	4.6 (0.8)	6.1 (0.7)
Intrinsic motivation, mean (SD)	4.4 (0.7)	4.5 (0.7)	4.4 (0.7)
Gender			
Female	1176 (82.8%)	300 (81.5%)	876 (83.3%)
Male	244 (17.2%)	68 (18.5%)	176 (16.7%)
Age	1176		
≤ 25 years	12 (0.8%)	4 (1.1%)	8 (0.8%)
26 – 30 years	125 (8.8%)	43 (11.7%)	82 (7.8%)
31 – 35 years	169 (11.9%)	70 (19.0%)	99 (9.4%)
36 – 40 years	237 (16.7%)	59 (16.0%)	178 (16.9%)
41 – 45 years	269 (18.9%)	66 (17.9%)	203 (19.3%)
46 – 50 years	182 (12.8%)	43 (11.7%)	139 (13.2%)
51 – 55 years	186 (13.1%)	37 (10.1%)	149 (14.2%)
56 – 60 years	182 (12.8%)	35 (9.5%)	147 (14.0%)
> 60 years	58 (4.1%)	11 (3.0%)	47 (4.5%)
Level			
A	271 (19.1%)	73 (19.8%)	198 (18.8%)
B	1013 (71.3%)	241 (65.5%)	772 (73.4%)
C	108 (7.6%)	39 (10.6%)	69 (6.6%)
D	28 (2.0%)	15 (4.1%)	13 (1.2%)
Tenure			
≤ 5 years	446 (31.4%)	167 (45.4%)	279 (26.5%)
6 – 10 years	174 (12.3%)	42 (11.4%)	132 (12.5%)
11 – 15 years	194 (13.7%)	42 (11.4%)	152 (14.4%)
16 – 20 years	236 (16.6%)	51 (13.9%)	185 (17.6%)
21 – 25 years	145 (10.2%)	30 (8.2%)	115 (10.9%)
26 – 30 years	127 (8.9%)	21 (5.7%)	106 (10.1%)
31 – 35 years	80 (5.6%)	14 (3.8%)	66 (6.3%)
> 35 years	18 (1.3%)	1 (0.3%)	17 (1.6%)
Year			
2021	710 (50.0%)	184 (50.0%)	526 (50.0%)
2022	710 (50.0%)	184 (50.0%)	526 (50.0%)

A total of 710 respondents participated in both survey waves, making for a sample of 1420 observations. Table 3.1 (column 1) provides an overview of the demographic characteristics of our sample. Women make up most of the sample (82.8%), which is in line with the overall overrepresentation of women in the agency. The sample is evenly distributed in terms of age groups, except for the lower number of respondents in the youngest and oldest age categories. The data show that the average tenure among respondents is relatively low, with almost a third of respondents having a tenure of less than five years (31.4%). Most respondents also held a high function level (90.4% with level A or B) which indicates that most respondents were relatively highly educated (A: Master's degree or equivalent, B: Bachelor's degree or equivalent, C: secondary education diploma, D: no diploma required).

Goodness-of-Fit analyses indicate the sample is not entirely representative for the population of employees in the agency, revealing issues with gender ($\chi^2(1)=11.76$, p-value=.0006), tenure ($\chi^2(7)=19.84$, p-value=.0059) and level ($\chi^2(3)=13.76$, p-value=.0032). A common approach to increase representativeness of such a sample exists in calculating and using weights based on specific population characteristics. However, the use of weights would, in our case, only offer a false sense of representativeness.[7] Due to the limited representativeness of our sample, caution is needed when drawing causal inferences.

Measures

Proactive work behavior consisted of five items asking respondents about their perceived proactivity at work. The first three items are adapted from Cangiano, Parker & Yeo's (2019) measure of proactivity; the last two items were developed in cooperation with the agency: 1) I come up with ideas to improve the way my tasks are performed; 2) I introduce better ways to perform my tasks; 3) I come up with creative ideas; 4) I raise issues even though I assume that a dispute may arise; 5) I make suggestions about how recurring problems can be avoided. These items align with the core definition of proactive behavior as being both future-oriented and change-initiating (Parker et al., 2006). The answer categories ranged from 1 – never to 5 – always. For the analysis factor scores were calculated. Factor analysis (available in appendix) shows that all five items load on the same factor (eigenvalue > 1).

To measure respondents' perception of the overall frequency and impact of changes they experienced, we use four items adapted from Rafferty & Griffin (2006). The items included: 1) Change occurs frequently in my work context; 2) I feel that we are always changing things; 3) Taken together, the changes of the past three years have had a significant impact on my work; 4) I feel that the same things in my immediate work environment are constantly being changed. Answer categories ranged from 1 - strongly disagree to 7 - strongly agree. Factor analysis (available in appendix) confirms that all four items load on the same

[7] A common approach to increase representativeness of a sample exists in calculating and using weights based on specific population characteristics. Yet, when estimating causal effects (in our case the effect of perceived changes on proactivity), the question whether to weigh data is extremely complex (see also Solon, Haider, Wooldridge, 2013). The use of weights is strongly supported when the sampling probabilities vary endogenously (sampling probabilities are correlated with the error term in the regression). However, if they vary exogenously, and thus purely on explanatory variables, weighting is unnecessary and even harmful for precision (Wooldridge, 1999; Solon, Haider, Wooldridge, 2013). We notice variations in our explanatory variables but are unable to detect if the sampling probabilities also vary endogenously. Moreover, if we would add weights, we are only able to construct weights based on official statistics which relate to observable characteristics (e.g., gender, age, education...). Even if the sampling probabilities vary endogenously, the weights would not be able to solve this issue (see for more information regarding this topic; Wooldridge, 2002 and Fitzgerald, Gottschalk, and Moffitt, 1998). Consequently, the use of weights would, in our case, only offer a false sense of representativeness. Due to the limited representativeness of our sample, caution is needed when drawing causal inferences.

factor (eigenvalue > 1). Further analyses are performed with the alpha-score (the summative score divided by the number of items over which the sum is calculated). Differencing our measurement of change across the two times of measurement (2021 vs. 2022) tells us to what extent respondents perceived *new changes* in the last year. To discern the effect of *past changes* experienced, we use the measurement from the first survey wave and divide our sample into two respondent groups: those who experienced many changes in the past vs. those who only experienced few. For this we used a cutoff value of '6' (based on the alpha-score), meaning only those who fully to strongly agreed that change over the past years happened frequently and was impactful were categorized in the 'many changes' group. By using a cutoff value at the higher end, we make sure that the respondents in the 'many changes' group effectively perceived a high amount of change in the past years. Columns 2 and 3 of Table 1 present information on the characteristics of both groups.

Several control variables were also included in the analyses. A first control variable is intrinsic motivation, which consists of five items to determine to what extent respondents are intrinsically motivated to put in effort at work (factor analysis available in appendix). Example items include: I put in effort at work, because the work I do is interesting; because I find it personally important to dedicate myself to my work; because committing myself to this work is consistent with my personal values (cf. Strauss, Parker, & O'Shea, 2017). This measure was included since literature indicates this type of motivation is a strong driver of proactive work behavior (Parker et al., 2010). Several authors found that proactive actions are facilitated when they are motivated by an innate interest or enjoyment in the task itself, or because the proactivity helps to achieve goals that are extremely important to an individual (Parker et al., 2010; Ryan & Deci, 2008). It is also an important factor to consider when looking at the personal consequences of behaving proactively (Cangiano & Parker, 2016). In addition, the following demographic controls variable were included, in line with previous research on proactivity: function level, tenure, age (cf. Fay & Sonnentag, 2002; Sonnentag & Spychala, 2012; Fuller, Marler, & Hester, 2006). Finally, our analyses also include the year in which the survey was administered, to control for any effect of the time of measurement.

Method and results

The method consists of first difference analysis. At the start of this study, each individual was assigned a unique identifier code so their responses could be tracked across both survey waves. Using the data obtained from 710 respondents across two survey waves (2021 and 2022), we calculate the first difference estimator. We calculate the first difference for the dependent variable, proactive behavior, as follows:

$$\Delta y_{it} = y_{it} - y_{it-1}$$

Whereby t-1 refers to the previous period (with t referring to year 2022). We also do this for the explanatory variables:

$$\Delta y_{it} = \beta_0 + \beta_1(x)_{it} + (a_i + u_{it}) - [\beta_0 + \beta_1(x)_{it-1} + (a_i + u_{it-1})]$$

a_i is called the fixed or unobserved effect, whereas u_{it} is the idiosyncratic or time-varying error and represents unobserved factors that change over time and affect y_{it}. From the above formula, it becomes clear that the fixed effect a_i is eliminated. Accordingly, factors that do not vary over time but could affect both the explanatory variables and proactive work behavior are removed (cf. Wynen & Op de Beeck, 2014). Examples of such time in-variant factors are organizational size and culture (at the organizational level), and personality traits and gender (at the individual level). The first-difference approach neutralizes the effect of these factors on our measurement of change and proactivity. This model thus reduces the issue of endogeneity, yet it cannot exclude it entirely. There might still exist certain time-variant factors we did not measure (and that are not controlled for by the first difference analysis), which could affect both our independent and dependent variables. Table 3.2 (column 1) presents the results of the first-difference estimator, analyzing the impact of perceived new changes (i.e., changes experienced between 2021 and 2022) on proactive work behavior. This is followed by the same analysis, but this time considering individuals' perception of past changes they experienced measured at t1, with results split out for respondents who experienced many changes vs. those that experienced few (columns 2 and 3). We estimate this model using ordinary least squares (OLS).

Table 3.2. First Difference Estimates

	Proactivity			
		Past changes		
Variables	Overall	Few	Many	Chi2
(diff) New changes	0.121***	0.223***	0.0657	3.73*
	(0.0368)	(0.0667)	(0.0467)	
(diff) Intrinsic motivation	0.133***	0.230***	0.0961**	2.02
	(0.0360)	(0.0839)	(0.0427)	
(diff) Age	-0.0548**	-0.135***	-0.0412	3.35*
	(0.0237)	(0.0431)	(0.0274)	
(diff) Level	0.658**	1.400***	0.427***	11.46***
	(0.2903)	(0.245)	(0.150)	
(diff) Tenure	0.000824	0.0120	0.000762	0.05
	(0.0154)	(0.0444)	(0.0203)	
Constant	0.0361	0.0171	0.0190	
	(0.0230)	(0.0724)	(0.0361)	
Observations	710	184	526	
R-squared	0.0445	0.1289	0.0215	

Note. Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The first regression is statistically significant (R2 = 0.0445, F(5, 704) = 6.56, p = .000), with perceived new changes having a significant positive impact on proactive work behavior (β = .121, p = 0.001). These results support our first hypothesis, indicating that proactivity might serve as a coping strategy in response to organizational change. Furthermore, the extent to which respondents are intrinsically motivated has a significant positive impact on proactive work behavior. This is line with extant literature on motivation and work performance that identified intrinsic motivation as an important driver and facilitator of proactivity (Parker et al., 2010; Ryan & Deci, 2008). The results also show a significant positive impact of respondents' function level on proactive work behavior. This is not surprising since these employees are more likely to have a role that encourages or often even requires a proactive work attitude (cf. Fay & Sonnentag, 2002; Erdogan & Bauer, 2005). We find a significant negative effect of age on proactivity, similarly to previous studies (e.g., Sonnentag et al., 2012; Binnewies et al., 2009). Sonnentag et al. (2012) suggests that employees' self-efficacy -a key antecedent of proactivity- is likely to increase with age, but that at the same time other processes might undermine older workers' tendency to show proactive behavior. They might, for instance, be less convinced that their proactive efforts will lead to positive outcomes (although they are confident that they can act proactively). Additionally, Binnewies et al. (2009) noted that decreased cognitive and self-regulatory resources may make it more difficult for older employees to allocate resources to certain tasks. This could also explain why proactive actions at work seem to decrease with age. Respondent's tenure did not significantly impact levels of proactivity.

Next, we performed another first-difference analysis, this time including individuals' perception of past changes (many vs. few, measured in wave 1). The results are shown in columns 2 and 3 of Table 3.2. As

mentioned, the cutoff to distinguish between respondents who experienced many changes in the past vs. those that experienced few was set at a value of 6 (based on average score calculated across all items; meaning only those who fully to strongly agreed that change over the past years happened often and was impactful were categorized in the 'many changes' group). Our results support our second hypothesis: While the effect of new changes on proactivity remained significantly positive for employees who only experienced few changes in the past ($\beta = .223$, $p = 0.002$), this effect disappeared for respondents who had already experienced many changes in the past ($\beta = .0657$, $p = 0.170$). For the latter group, experiencing new changes (in the last year) did not lead to a significant increase in proactive work behavior. The last column of Table 2 displays whether the coefficients of both regressions significantly differ. The results confirm that the coefficient for new changes experienced significantly differs across both groups. Furthermore, we note that for both respondent groups, function level and intrinsic motivation remained significant predictors of proactivity. Age also maintained its significant negative impact on proactivity but only for the group that experienced few changes in the past. This may imply that in a work context of ongoing organizational change, even older workers may experience some pressure to behave more proactively (reducing the negative effect of age). The effect of respondents' tenure level remained insignificant.

Discussion and conclusion

This paper examines how civil servants' past change experiences affect their ability to behave proactively in response to new changes. The analyses were performed with longitudinal data of two survey waves, held at a Belgian government agency. The empirical analysis confirmed our theoretical expectations. We find a positive relationship between (perceived) new changes and proactive work behaviour. However, taking a closer look at the data, we find that this positive effect is limited to employees who only experienced few changes in the past (at the time of the first survey wave).

We conceptualized proactivity as a problem-focused form of coping employees might use to address the aspects of change that are causing them distress (such as reduced job control or autonomy). Our analyses demonstrated that employees indeed used this coping strategy in response to new changes they experienced over the last year. However, this was only true for those employees who had experienced low levels of organizational change at the time of the first survey wave. Those who had already experienced many changes in the past did not respond by increasing their proactive behaviour. This is in line with our prediction based on COR-theory, assuming that employees who experience frequent and impactful change suffer from resource depletion, making proactivity increasingly difficult. It confirms our

assumption that they would not have the required resources anymore for behaving proactively and instead would favour more defensive strategies for resource preservation.

Such lowered proactivity can be problematic for several reasons. First, the turbulent environment in which public organizations operate, requires a proactive, adaptable workforce (Cangiano & Parker, 2016; Sørensen & Torfing, 2011). Many changes are therefore aimed at achieving such a proactive and adaptable workforce. However, our results show these changes may under some circumstances achieve the exact opposite. When civil servants stop behaving proactively in response to changes, this could undermine the long-term adaptability of public organizations. Second, Lazarus & Folkman's (1984) stress and coping theory as well as empirical studies (e.g., Callan, 1993) indicate that proactivity is an important problem-focused coping behavior. In the context of organizational change, civil servants may resort to proactive behavior to cope with change-related stressors. However, our results show that, paradoxically, experiencing very frequent organizational change undermines employees' capability to resort to proactivity. Our findings indicate that when employees already experienced many changes in the past, they are likely to suffer from resource depletion, which not only undermines proactivity but arguably also has negative effects on overall individual wellbeing and job performance (cf. Hobfoll et al., 2018).

Whereas our theoretical argument was formulated in a generic way and is therefore potentially applicable to any kind of organization, the empirical setting of the paper is a government agency. What are the implications of our findings for public organizations in particular? A widespread stereotype about public sector organizations is their inherent stability, or, negatively framed, their failure to adapt to changing circumstances and to innovate. An important lesson from recent scholarship is that public organizations are subject to frequent structural changes such as mergers or split-ups (Lægreid et al. 2013; MacCarthaigh 2014; Fleischer et al. 2022). At the organizational level, several studies have demonstrated problematic effects of frequent organizational change in government organizations, such as higher absenteeism rates (Wynen et al. 2019), increased fear of speaking up (Wynen et al. 2020), and diminished role clarity (Verlinden et al. 2022). Against this background, our findings add a micro-level perspective to this growing body of literature, suggesting that organizational change should be used with caution if decision-makers wish to avoid problematic effects.

However, changes are often driven by political concerns, such as governments' or ministers' desire to signal their policy intent or to demonstrate their ability to reform the government apparatus (James et al. 2016). Hence, public employees are confronted with organizational changes they may not perceive as driven by changes in the organization's environment or internal problems. When change is externally imposed, public organizations and their leaders can actively seek to prevent such changes or mitigate

their effects (Dommet & Skelcher 2014; Askim et al. 2020). Pressures to achieve short term political deliverables may also undermine civil servants' capacity to work proactively towards longer-term goals (Pandey, 2010). Consequently, the effects of organizational change on civil servants' proactive behavior could vary depending on the nature of change events (externally imposed vs. self-initiated), which could be explored by future research.

The documented effect of turbulent change episodes on proactive behavior in this paper must also be analyzed in the light of the specific characteristics of public sector employees. An extensive literature on "Public Service Motivation" (PSM) demonstrates that they are particularly motivated to contribute to society (see Vandenabeele et al. 2018 for an overview). A key implication is that our results may be specific to public sector organizations. If public employees are especially motivated to contribute to society through their work and self-select into public organizations because of their intrinsic concerns for policy (Gailmard 2010), they arguably may be motivated to "try harder" despite the adverse circumstances of ongoing organizational change. For instance, the high motivation of public employees to contribute to society despite difficult working conditions has been demonstrated in multiple studies of street level bureaucrats' coping behavior (Tummers et al. 2015). Hence, we may see a different picture in private organizations, where employees typically score lower on PSM and may display less proactive behavior in response to organizational changes (e.g., Andersen, Pallesen, & Pedersen 2011).

Our findings also add to existing insights on civil servants' role as change agents. McDermott et al. (2013) already challenged the straightforward distinction between civil servants as recipients vs. agents of change, showing how 'first-order' policy recipients can become 'second-order' change agents who proactively adapt and add to policy initiatives to suit local contexts. In recent years, public management scholars have continued to emphasize that civil servants are not merely passive recipients of change, but that they also actively contribute to the success of change initiatives (Oreg et al. 2018, Ahmad et al. 2020). Ahmad et al. (2020) identified a number of individual attributes and organizational factors that affect civil servant's activity/passivity during times of change. They found that civil servants who displayed high levels of (internal) locus of control, change-related self-efficacy, and prosocial motivation were more likely to proactively respond to change efforts (Ahmad et al., 2020). Civil servants were also more likely to display proactive behaviors in contexts characterized by effective change leadership and low formalization. Although we measured proactive behavior in a more general manner (i.e. not specifically in response to change), our results can add to these insights by further specifying conditions under which civil servants are most likely to respond proactively in a context of organizational change. Specifically, our findings indicate that having a history of frequent and impactful change will hinder civil servant's capacity to respond proactively and act as second-order change agents. At the same time, Ahmad's (2020) insights

suggest that effective change leadership may buffer the negative impact of frequent change on proactivity.

While we have not explored the mediating impact of factors such as leadership and change management, previous public management studies found that certain types of leadership can be effective in reducing employee resistance to change and can help promote active work attitudes (e.g., Ancarani et al., 2020). Transformational leadership, for instance, has been recognized as effective in the public sector for promoting proactive work behavior (Strauss et al., 2009) and related attitudes such as work engagement (Ancarani et al., 2020) and innovative behavior (Hansen & Pihl-Thingvad, 2019). By inspiring and motivating employees through a shared vision, transformational leaders encourage them to go beyond their formal job requirements and take initiative (Strauss et al., 2009). Transformational leadership can thus help create an environment that fosters innovation and proactive problem-solving. In addition, servant leadership, which emphasizes leaders' role of serving the needs of their employees, was also found to facilitate employee proactivity in the public sector (Mostafa & El-Motalib; 2019). By supporting and empowering employees, servant leaders create a sense of ownership and responsibility that encourages proactive work behavior (Luo & Zheng, 2018). Based on these insights, future research may examine if these leadership styles can mitigate the detrimental effect of past change experiences on civil servant proactivity. Besides leadership, factors such as social support, workplace climate and culture may also serve as important resources that can boost civil servants' ability to overcome the turbulence of changes and still behave proactively (cf. Franken et al., 2022). We therefore conclude that change should not necessarily be avoided, but that efforts should be made to pace change whenever possible. This also implies that short-term political interests should be more actively balanced with those of the administration. By creating resource-rich work environments, public organizations can help their employees cope with a constantly changing work environment.

Finally, the paper demonstrates the added value of conducting longitudinal survey research for studying public organizations. Many theories and phenomena of interest to scholars of public organizations are dynamic in nature, but this substantial interest is not always matched by research methods which are often cross-sectional in nature. Despite this methodological strength, our article suffers from some limitations which should be addressed. A first limitation relates to our measurement of past changes experienced. This measurement was adapted from Rafferty and Griffin (2006), asking respondents about the overall frequency and impact of changes they experienced over the past years. This measure covers two of Rafferty and Griffin's four original dimensions but does not cover change-related uncertainty or the extent to which change was planned. However, extant literature agrees that frequent change will usually be accompanied with considerable uncertainty for employees, even if change initiatives are

strategically well planned by management (Bordia et al., 2004). Rafferty and Griffin also note that "when change occurs very frequently, individuals are likely to feel fatigued by change and experience an increase in anxiety due to the unpredictability of change in that setting (2006, p.1155)." Hence, we believe that our items that measure the overall frequency of change implicitly also capture part of the uncertainty aspect of change. Furthermore, we should note that our measurement of change does not capture the valence or substantive fit of changes with employee values. Hence, we do not know whether respondents think positively or negatively about these changes on a substantive level. Kiefer et al. (2015), already found that not all change is experienced negatively by civil servants, and that innovation-related change may even have positive effects on their work engagement. Since an accumulation of changes with a negative valence may be more detrimental to civil servant work attitudes, future research can focus on discerning the effects of different types of organizational change on civil servant proactivity. Another limitation concerns the generalizability of our results. Since data have been collected from one government agency in Belgium, it remains unclear to what extent our findings can be generalized across different contexts. Future research may examine if our results hold across different regions, cultures, and governmental levels."

Article 4: Spiraling out of control? The impact of chronic stress on civil servant perceptions of the frequency of workplace changes.[8]

Introduction

The turbulent COVID era, as well as global political and economic instability, have been putting governments to the test. Increasingly, we hear calls for more resilient governance capable of dealing with complex and disruptive problems (cf. Ansell, Sørensen & Torfing, 2020). To achieve such resiliency, the capacity to deal successfully with rapid change is vital. Meanwhile, scholars and practitioners have warned that such a frequently changing work environment may exceed civil servants' capacity to adapt, causing widespread change fatigue (de Vries & de Vries, 2023). This is supported by a growing body of public management research linking perceptions of frequent change to various negative outcomes, both at the individual and organizational level (Wynen et al., 2017; 2020; 2022). Scholars have sought to explain this by drawing on theories such as Lazarus & Folkmans' model of stress and coping (1984) and threat-rigidity theory (Staw, Sandelands & Dutton, 1981). Both theories emphasize the importance of perception, proposing that the extent to which employees perceive events as threatening will determine if – and to what degree – they experience stress, and what their subsequent coping behaviors will be. Accordingly, authors have argued that civil servants will perceive frequent organizational change as threatening, leading to chronic stress and (often) maladaptive coping behaviors (e.g., Terry & Callan, 2000; Wynen et al., 2022). Meanwhile, research from cognitive psychology and neuroscience indicates this relationship may well be reversed, since stress often leads to a distorted view of reality and affects our perception of workplace events, including change (Bar-tal et al. 2013, Epel et al., 2018, Vernooij et al., 2008). This urges us to consider if chronic stress in civil servants may also distort their perceptions of the frequency at which change occurs.

Certain studies have already indicated that employee's subjective experience of change does not necessarily align with objective measures of change exposure (Loretto et al., 2010; Rafferty & Griffin, 2006; Rafferty & Jimmieson, 2017). Authors have explained these discrepancies by arguing that objective measures do not capture how employees perceive and interpret change (e.g., Rafferty & Jimmieson, 2017). Accordingly, any objective measurement of employee exposure to change will be insufficient to understand or predict employees' reactions to it (Rafferty & Jimmieson, 2017). Meanwhile, change management strategies are often developed based on such objective accounts of change, leading to uniform strategies for managing employee responses (Kotter & Schlesinger, 2008). The low success rate

[8] This article is under review at Review of Public Personnel Administration, and was co-authored by prof. Jan Wynen, Dries Van Doninck, dr. Laurence Roosens, prof. Christophe De Block, and prof. Jan Boon.

of public sector change indicates that such a one size-fits-all approach to change management is not delivering the desired results (Andrews et al., 2006). Since an adaptable workforce will be crucial for achieving resilient governments that thrive in turbulent times, it seems paramount to deepen our understanding of the factors that affect civil servants' perceptions of ongoing change. Therefore, we examine the impact of chronic stress on civil servants' perceptions of change frequency. Data were gathered from five local government organizations. To measure chronic stress, we used a physiological measurement of the stress hormone cortisol present in the hair. These data were linked with survey responses capturing the workplace changes civil servants experienced. Using a physiological measurement of stress enables us to mitigate common-method bias issues.

By examining if chronic stress impacts civil servants' perceptions of organizational change frequency, we aim for a more profound understanding of the change-stress relationship. We contribute to the change management and public management literature in two ways. First, our results confirm that chronic stress biases civil servant perceptions of the frequency at which change occurs. While we can expect variability in value judgments about change, on its substantive impact and the way it is managed (e.g. Kleizen et al., 2023; Kleiman et al., 2022), such variability in perceived frequency of change remains underexposed. Second, we derive important implications for public sector change management. Specifically, we note that chronic stress among civil servants may make it increasingly difficult to inform and engage all of them with a single change strategy. Ongoing efforts to help civil servants manage their stress levels will be instrumental in preventing that differences in perceived change become unmanageable. Finally, our results also point at the need for more personalized change management interventions.

In the next section, we present our theoretical framework starting with Conservation of Resources-theory (Hobfoll, 1989) to explain how chronic stress develops through resource depletion. Then, we draw from literature on cognition to examine how individuals make judgements about change, and how these judgements may become biased due to the resource depletion associated with chronic stress. The sample and data collection methods are described in the Data section, followed by a description of the results. In the Discussion and Conclusion sections we discuss our main findings and reflect on the implications for practice.

Theoretical framework

Chronic stress – a COR framework

While public sector work environments are inherently complex, dynamic, and frequently stressful, they have become even more turbulent in the current era characterized by new and disruptive problems (Walinga & Rowe, 2013; Cirstofoli et al. 2022). Evidence from the field suggests that civil servants find it increasingly difficult to cope with this workplace turbulence and associated stress (de Vries & de Vries, 2023). Moreover, growing accounts of excessive workplace stress and deteriorating employee wellbeing throughout government organizations suggest that stress is increasingly becoming chronic (Taylor, 2023). Chronic stress is typically defined as a type of stress resulting from longer-term or repeated exposure to stressful conditions, in which demands and pressures exceed available coping resources (Demerouti et al., 2001). In the context of this study, a measure of chronic stress is preferable as it more closely aligns with the contemporary work environment of civil servants. In addition, chronic stress has been found to better capture stress-related effects in individuals and organizations (Baum et al., 1993; Ganster, 2008).

To understand how chronic stress develops, COR theory offers a useful framework. The theory was first developed by Hobfoll (1989) and has since been widely studied and applied in various fields, including psychology, sociology, and organizational behavior. COR describes how individuals strive to acquire, protect, and preserve their resources in order to cope with stressors and achieve personal goals, in all facets of life (i.e. personal and professional). Resources have been broadly defined as anything that is valued by an individual, such as time, energy, money, social support, and personal characteristics (e.g., self-esteem, persistence, control,...) (Hobfoll et al., 2018). Hence, in the context of work, the more resources an employee has, the better he or she is expected to cope with challenging work circumstances. As such, individuals will strive to acquire new resources and to avoid any resource loss. COR posits that, when resources are threatened or are actually lost, individuals will experience stress (Hobfoll et al., 2018).

COR theory further specifies that resource loss is disproportionately more salient than resource gain, which is referred to as the 'primacy of loss principle'. This principle implies that individuals will place greater importance on preventing resource loss compared to the acquisition of new resources, especially when they have few resources left (Hobfoll, 1989; 2001; Halbesleben & Bowler, 2007). The second principle underpinning COR-theory is that individuals must invest resources in order to protect against (further) resource loss, to recover from previous losses, and to gain additional resources (cf. 'resource investment principle') (Hobfoll, 1989; Hobfoll et al., 2018). However, Hobfoll also explains that as individuals lose resources, investment becomes increasingly difficult. These reinforcing dynamics of

resource loss and the inability to re-gain resources may cause individuals to become trapped in a resource loss spiral (Hobfoll et al., 2018).

These key principles of COR-theory can help us understand how chronic stress develops in civil servants. Meeting increasing performance expectations and adapting constantly to new systems, procedures, and policies places heavy resource demands on civil servants. When individuals face such high demands for extended periods of time their coping resources risk becoming depleted (Hobfoll, 1989; Westman et al., 2004). Following the COR principles, civil servants will then invest their energy in protecting the resources they have left, rather than trying to (re)gain additional resources. This increases their chances of ending up in a vicious cycle of resource loss. When individuals constantly lose or fear to lose resources, chronic stress is likely to develop (Clifton & Feeny, 2015; Hobfoll et al., 2018). The notion that chronic stress goes hand in hand with resource depletion will be essential to understand how chronic stress affects change perceptions, which is discussed next.

How chronic stress leads to biased perceptions of change frequency

Extant research has demonstrated that civil servants can have different opinions on the outcomes or the impact of change events (e.g. Kleizen et al., 2023; Kleiman et al., 2022). Even when confronted with the same changes, they can still have different perceptions of the value these changes bring. Meanwhile, we would still expect them to perceive the same amount of change. However, research indicates that certain factors cause a bias or 'error' in people's perception of events (Kreitner & Kinicki, 2008). With bias, we refer to a systematic (i.e. non-random and thus predictable) deviation from rationality in judgment or decision-making (Baron, 2008). Bias can therefore be distinguished from common subjectivity, since it distorts perceptions in a particular direction and is irrational in nature (Baron, 2008). Hence, any specific deviations in perceived frequency of change in individuals who have been exposed to the same changes, indicates a bias is at play. This is because there is no 'rational' basis for differences in perceived frequency of change.

Stress is one of the most well-researched factors known to elicit bias (Yu, 2016). Authors have explained this using a dual-process model, which proposes that people make judgements via two possible routes: a fast route labeled System 1 and a slow route labeled System 2 (Kahneman, 2011; Evans, 2008). System 1 operates quickly and automatically with little effort, and leads to intuitive decisions and judgements (Kahneman, 2011). It relies on mental rules of thumb ("heuristics") and often result in thinking biases (Kahneman, 2011). On the other hand, System 2 runs slowly and in an effortful manner, requiring complex deliberation. In normal situations, the intuition system initiates a default judgement, and the reasoning

system checks whether such a judgement is compatible with the current environment (Yu, 2016). That is, intuition proposes first and reasoning decides whether to approve or modify it (Yu, 2016). However, research has revealed an over-reliance on type 1 thinking when perception occurs under taxing or resource-depleting conditions (Macrae et al., 1994). Accordingly, when under stress, the reasoning system may not check intuitive default responses and may fail to correct any errors that occur. This is because intuitive responses are fast and require fewer cognitive resources to execute than System 2 (Kahneman, 2011). Consequently, stress will make people more prone to bias, because of an over-reliance on fast and intuitive thinking rather than deliberative thinking (Yu, 2016).

Next, we will explore what type of bias we can expect in people who suffer from chronic stress, building on insights from Epel et al. 2018. In their transdisciplinary model of stress they explain how chronic stress exposure impacts individuals' cognitive appraisal of events, taking into account that stress is experienced on the psychological and physiological level. Such a model seems preferable, since our measurement of stress is a physiological one, based on cortisol levels present in the hair. Cortisol, like other steroid substances, is incorporated in hair growth. Analyzing the concentration of hair cortisol provides us with a measure of stress accumulated over the past three months, offering an indication of 'chronic stress' (as opposed to acute stress). Interestingly, cortisol has been identified as an important stress marker causing a shift from deliberate, reflective cognition (system 2) toward automatic, reflexive information processing (system 1) (Margittai et al., 2016).

Epel et al. (2018) posit that the physiological expression of chronic stress (such as raised cortisol) will be accompanied with psychological effects. Specifically, it will impact people's 'mental filter', the lens through which they see the world. In case of excessive past and ongoing exposure to stressful circumstances, "one's mental filter is prone to habitually amplify cognitive and emotional responses to stressful stimuli leading to exaggerated threat appraisals" (Epel et al., 2018, p.149). Put differently, individuals who suffer from chronic stress will tend to overestimate the threatening nature of events. Moreover, these intuitive perceptions of threat are unlikely to be corrected by deliberate (system 2) thinking, as noted earlier. The notion that chronic stress will lead to exacerbated perceptions of threat has been supported by several studies in cognitive psychology and neuroscience (e.g., Bar-tal et al., 2013; Yu, 2016). Korte (2001) and Sapolsky (2000), for instance, found that chronic stress promotes selective attention to negative precedents and consequently produces a tendency to find threat and risk where none exist. Psychologists Bar-tal et al. (2013) have argued that persistent stress will cause employees to appraise their coping resources as less adequate while at the same time increasing their need for certainty and control. This in turn will make them more likely to appraise situations as threatening. This reasoning is supported by neuroscience research linking raised cortisol levels (indicating chronic stress) to a decrease

in resources such as self-esteem and internal locus of control, and negative self-beliefs overall (e.g., Pruessner et al., 2005, Thomas & Larkin, 2010). Similarly, other authors have found that stress undermines individuals' sense of control and – by endangering the perception of controllability – fosters perceptions of threat (e.g., Friedland et al. 1992). Hence, resource depletion not only explains how chronic stress is created and sustained (cf. Hobfoll's COR-theory), it also plays a crucial role in the emergence of biased thinking, specifically a negative bias that creates exacerbated perceptions of threat.

While several studies thus have suggested a reversal of the threat-stress relationship (e.g. Epel et al., 2018; Bar-tal et al., 2013), this study is one of the first to examine what this means for employee perceptions of change. When we apply these insights to the context of organizational change, we find that chronic stress can bias employees' perceptions of change by making them more likely to think of changes as being threatening to them personally. Exacerbated perceptions of threat will also introduce other related errors in people's judgement of organizational change. Attentional bias, for instance, is another type of cognitive error stemming from increased threat appraisals. It refers to the tendency to focus excessively on certain stimuli while ignoring others (Vernooij et al., 2008). Research across various disciplines indicates that stress -both acute and chronic- is one of the main factors that induces attentional bias (McHugh et al., 2010; Andreotti et al., 2015). Specifically, stressed individuals appear to have a disproportionate amount of attention for threatening events, objects, or people (e.g., Mogg et al., 1990; Bar-haim et al., 2007; Tsumura & Shimada, 2012). Since we already noted that stressed individuals are more likely to perceive organizational change as threatening, this suggests they are also likely to spend a disproportionate amount of attention towards the (potential) occurrence of change events (cf. Bar-tal et al., 2013; Mogg et al., 1990).

In summary, we find that the resource-depleting nature of chronic stress can cause employees to have stronger threat appraisals of organizational change. Consequently, this also increases their selective attention for change, and they will more consciously pick up on change events (whether they are directly affected by them or not). These reinforcing dynamics between chronic stress, threat appraisals of change, and attentional bias toward threat, may lead chronically stressed employees to systematically perceive more frequent change compared to their colleagues with lower levels of stress. We arrive at the following hypothesis:

Higher levels of chronic stress among civil servants are positively associated with an increased perceived number of organizational changes.

Data and measures

This study explores employee perceptions of workplace changes in five municipal organizations in Flanders, Belgium. The five municipalities are similar in terms of rural location and population size (having approximately 10.000 inhabitants (min: 8014, max: 12576)). The municipal organizations themselves are also similar in size, each one employing approximately 60 white-collar employees in total (min: 47, max: 72). Due to the state structure and regulations, these municipal organizations have identical competences which they have to meet with similar resources.

Within these municipal organizations, we invited civil servants to complete a survey about the workplace changes they experienced, and to provide a hair sample in order to measure their stress levels. We repeated this process every three months for a total of nine months. In total, 102 civil servants participated in each of the three waves of our project, leading to a balanced panel structure. The response rate for each wave was around 33%, whereby the attrition rate between waves was negligible. However, the sample was not representative of the targeted population, as females were overrepresented. [9]

Measuring change frequency in the work environment

The survey asked respondents to indicate which of the following types of changes they had experienced in the past 12 months (first wave) or past 3 months (second and third waves). The selection of these changes was made in consultation with the management of each organization and pilot surveys were conducted to ensure that the questions were accurate. Respondents could answer yes or no to the following changes. However, since we asked about changes of the prior year, we deleted respondents (total of 9 observations) who had a tenure of less than one year, or who changed work unit or role in the past year.

- Physical change: A change to the physical environment of the workplace, such as a renovation, move, or redecoration.
- Structural change: A change to the organizational structure, such as a change in the reporting lines or the division of responsibilities.
- Change in management team: A change to the management team, such as the hiring of a new manager or the departure of an existing manager.
- Change in direct leader: A change to the direct supervisor, such as the hiring of a new supervisor or the departure of an existing supervisor.

[9] Zie footnote 7 on the use of weights and why it would only offer a false sense of representativeness.

- Change in function: A change to the job role, such as a change in the tasks and responsibilities of the job.
- Change in processes: A change to the way work is done, such as a new way of handling customer complaints or a new way of processing orders.
- Hiring: An increase in the number of employees.
- Downsizing: A decrease in the number of employees.

For each respondent and wave, we calculated a total score to indicate the number of changes they perceived. This score could range from 0 (no changes perceived) to 8 (all changes perceived).

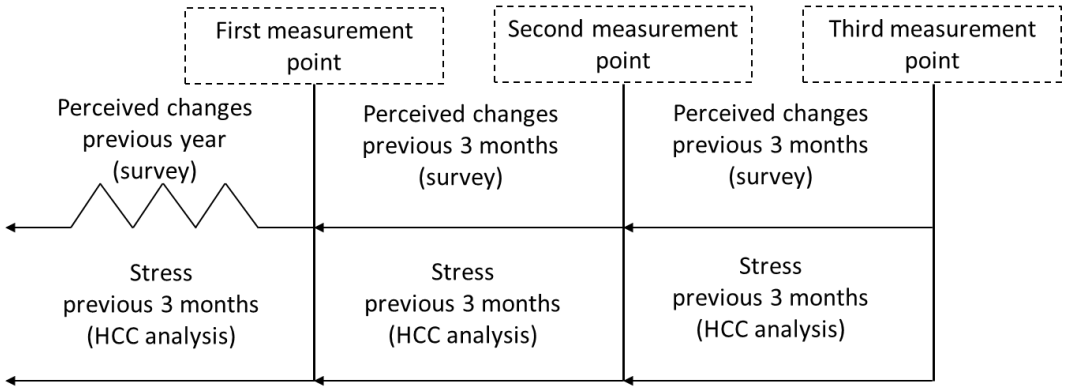
Measuring chronic stress

Stress is often measured with survey items that tap into a respondents' subjective appraisal of their feelings of distress in the workplace (Ganster, 2008). This approach has limitations to measure chronic stress as it is a "snapshot" and is responsive to individual changes in the short-term, like moods or affective states. They are therefore more likely to capture acute feelings of stress, but often fail to capture the underlying stress-related processes leading to longer-term outcomes (Ganster, 2008). Additionally, using self-report survey items can introduce classic threats to validity like social desirability bias and common method variance (Podsakoff et al., 2012). To overcome these issues, this paper introduces Hair Cortisol Concentration (HCC) analysis.

A strand of hair (at least 3 cm, approx. pencil thick) was collected of each participant from the back of their head (posterior vertex) after they completed the survey. This hair sample was used to measure the concentration of cortisol. This hair cortisol concentration (HCC) analysis is capable of providing an easily obtainable index of cortisol (an important stress hormone) levels integrated over the extended period of hair growth, i.e. several months (Staufenbiel et al., 2013). It allows to capture long-term stress levels within individuals (Greff et al., 2019). By taking a longer time perspective, this approach thus overcomes the variability of cortisol levels and of self-reported stress measurements within individuals (e.g. differences linked to time of day) and the effect of acute influences (e.g. sickness). Moreover, hair sampling is non-invasive, easily conducted and generally well tolerated by participants (Greff et al., 2019). Medical professionals of a University Hospital were involved throughout the research project, including the design of the survey, organization and support of data gathering, analysis of hair samples and interpretation of the results. Scalp hair collection was performed in accordance with guidelines published by the Society of Hair Testing (Cooper et al., 2012).

Our HCC analyses result in an objective indicator for stress levels which the respondent has experienced during the three months prior to each survey moment (see Figure 4.1). The analysis is done using a liquid chromatography-tandem mass spectrometry assay developed in-house in the laboratory of the University Hospital. For a critical review of HCC analysis, we refer to Stalder et al. (2017). A detailed description of the HCC analysis can be found in appendix.

Figure 4.1. Overview of the research design



Cortisone use can disrupt cortisol secretion, which can cloud the relationship between cortisol and change perceptions. Therefore, we excluded observations from participants who used cortisone during the 9 months of our research study. We also excluded observations from participants with extremely high cortisol levels (above 31 pg/mg hair), as this is a threshold used to indicate a risk of Cushing syndrome, a disease that severely disrupts cortisol secretion. These restrictions led to a final sample of 43 civil servants who were followed over a period of 9 months with data collected every 3 months.

Our analysis of hair cortisol concentration is unable to differentiate between stress originating from work-related factors and stress caused by private factors such as family or financial issues. However, for the purposes of our study, the source of stress—whether from private or workplace factors—is not critical. We are primarily interested in examining the overall effect of stress on civil servants' perceptions of organizational change frequency. Furthermore, the distribution of these stress sources across our sample is expected to be random. There is no reason to believe that family problems causing stress, for example, would be more prevalent in one municipality compared to another. Therefore, any potential variations in stress sources across municipalities are unlikely to significantly influence our findings or conclusions.

Descriptive statistics

Table 4.1 shows the summary statistics for our variables, including both within-person and between-person variation. Within-person variation refers to change over time or within a given individual, while between-person variation refers to differences between individuals. Interestingly, we notice that there is more variation within a given individual (or over time) for both the total changes perceived and stress, compared to variation across individuals. The table also includes the specific changes separately. Based on the table, it is clear that change in processes and hiring were the most frequently reported changes. Table 4.2 offers more detail about the total sum of changes experienced over the total of three waves, and provides more detail about the distribution of the perception of changes experienced, our dependent variable. In Figure 4.2, the distribution over municipality and wave is depicted, with the municipality number indicated before the comma and the wave number indicated after the comma. The figure reveals significant variation in the changes perceived by civil servants, despite the fact that we did not explicitly inquire about subjective judgments. Instead, we focused solely on capturing the specific objective changes they experienced. This variation is particularly noteworthy considering the relatively small size of our municipal organizations, each consisting of approximately 60 white-collar employees. The findings suggest that individual interpretations and perceptions of change frequency may go beyond the scope of objective events. The observed variation in the data hints at the involvement of subjective factors that influence an individual's perception.

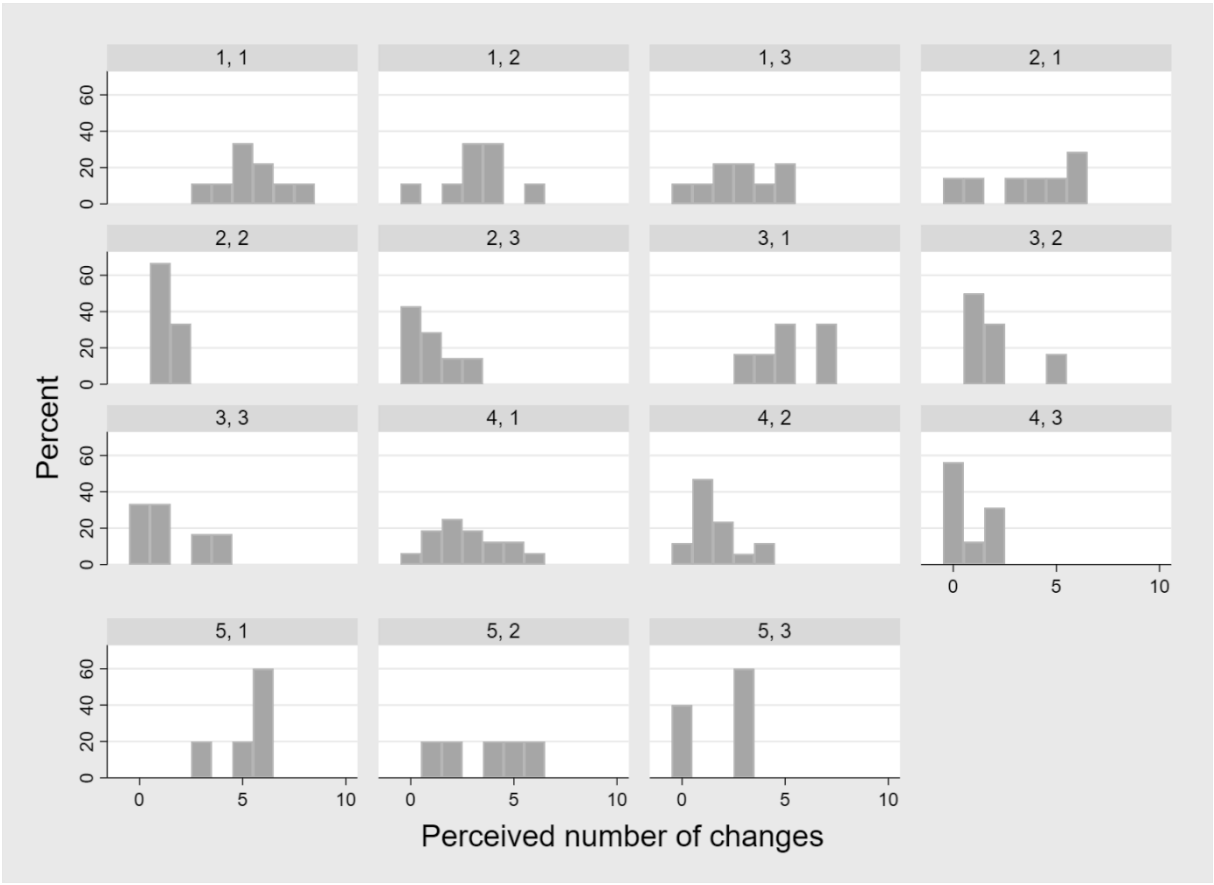
Table 4.1. Panel summary statistics: within and between variation (129 observations – 43 individuals across 3 waves)

Variable		Mean	Std. Dev.
Change perception	Overall	2.565891	2.038094
	Between		1.334394
	Within		1.549529
Physical change	Overall	0.302326	0.461056
	Between		0.289261
	Within		0.360844
Structural change	Overall	0.310078	0.464328
	Between		0.29453
	Within		0.360844
Change in management team	Overall	0.217054	0.413847
	Between		0.298884
	Within		0.288675
Change in direct leader	Overall	0.178295	0.384253
	Between		0.284975
	Within		0.260208
Change in function	Overall	0.286822	0.454041
	Between		0.304997
	Within		0.338502
Change in processes	Overall	0.465116	0.500726
	Between		0.349902
	Within		0.360844
Hiring	Overall	0.457364	0.500121
	Between		0.317257
	Within		0.388641
Downsizing	Overall	0.348837	0.478461
	Between		0.316675
	Within		0.360844
Stress (cortisol pg/mg of hair)	Overall	2.44881	5.460042
	Between		2.753392
	Within		4.72751

Table 4.2. Distribution of the number of changes experienced

Number of changes experienced	N	%	Cumulative %
0	22	17.05	17.05
1	27	20.93	37.98
2	22	17.05	55.04
3	18	13.95	68.99
4	13	10.08	79.07
5	13	10.08	89.15
6	10	7.75	96.9
7	3	2.33	99.22
8	1	0.78	100
Total	129	100%	

Figure 4.2. Overview of the perceived number of changes, by municipality (number before the comma), and wave (number after the comma)



To explore the relationship between perceived changes and cortisol levels, we created a scatterplot of the two variables (see Figure 4.3). This allowed us to visualize the data and see if there was any apparent correlation between the two variables.

Figure 4.3. Overall variation: Perceived number of changes versus cortisol levels

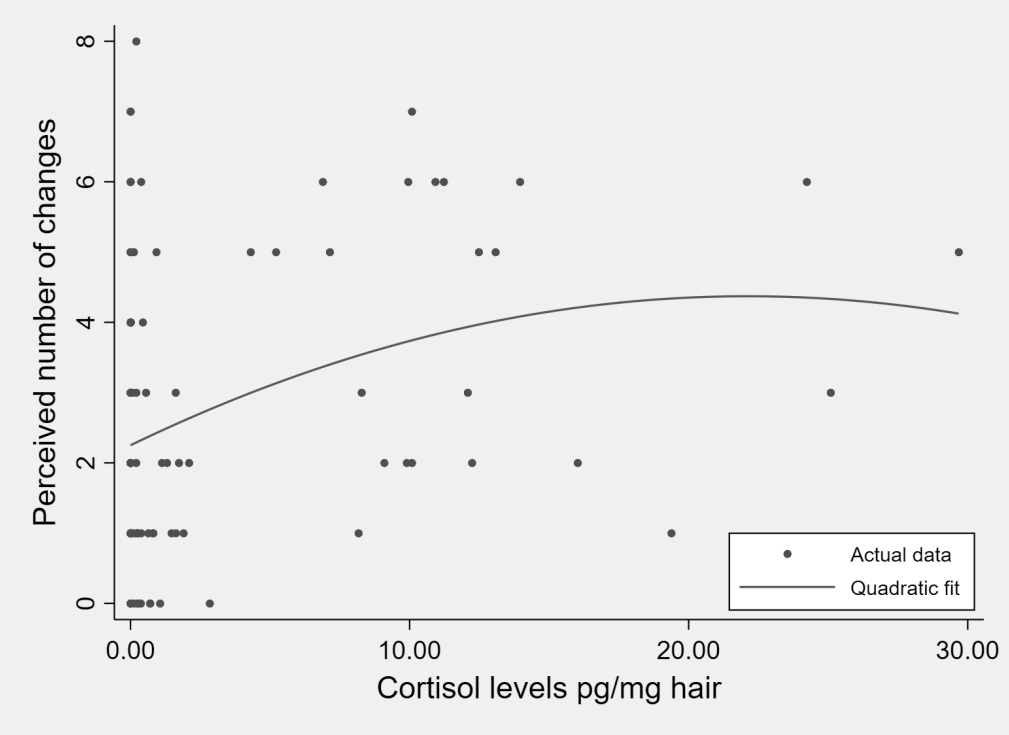


Figure 4.3 illustrates individual-wave pairs, with each point representing a specific pair. The solid line represents the quadratic fit obtained through ordinary least squares (OLS) regression, depicting the potential inverted U-shaped relationship between changes experienced and stress levels (measured by cortisol). Notably, the graph reveals a significant proportion of zeros in our primary independent variable, cortisol levels. This occurrence arises because our cortisol analysis fails to detect extremely low cortisol concentrations, which are automatically assigned a value of zero. In fact, out of our 129 observations, approximately 53% exhibit a cortisol level of zero.

The dependent variable, the number of perceived changes, demonstrates more diversity (see also Table 2). The majority of observations perceived 1 to 3 changes. Analyzing the scatterplot, we observe that a transition from 0 to 10 cortisol pg/mg of hair does not yield a comparable impact on perceived changes as a transition from 10 to 20 cortisol pg/mg of hair. This observation suggests the existence of diminishing returns to increased cortisol levels, indicating that the effect on perceived changes weakens as cortisol levels rise. Interestingly, starting from a cortisol level of 20 pg/mg of hair, the effect seems to diminish slightly.

Analysis and results

Prior to commencing the analysis, we performed a log transformation on our variable measuring cortisol levels to better capture the nuanced effects of cortisol on the perceived number of changes, as illustrated in Figure 4.3. The log transformation ensures that a percentage increase in cortisol levels corresponds to a constant effect. Furthermore, examining the relationship between changes experienced and stress levels introduces a potential issue of causality. It is plausible that changes themselves can lead to increased stress. However, our primary interest lies in investigating the impact of stress on perceived changes, rather than the reverse. To address this concern, we will incorporate the lagged value of stress in the subsequent analyses. Specifically, we will consider the stress levels experienced in the three months preceding the three-month period in which respondents reported changes. Since the changes have not yet occurred during the objective stress measurement period, they would not have influenced the cortisol levels at that particular measurement point. This approach strengthens our claim of causality, as we are specifically examining the influence of stress on perceived changes, rather than the other way around. Figure 4.4 visually represents this methodology.

Figure 4.4. Analytical strategy

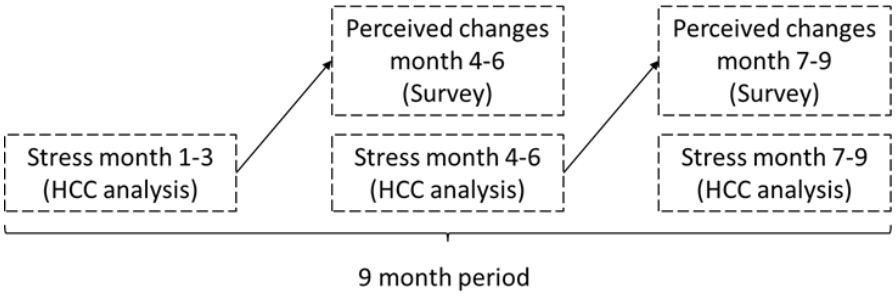


Table 4.3. Regression results

Variables	Within estimator (OLS)		Poisson individual-effects model	
	(1)	(2)	(3)	(4)
Lagged stress (log of cortisol pg/mg of hair)	0.298*	0.218	0.159**	0.0252
	(0.153)	(0.517)	(0.0771)	(0.296)
Lagged stress² (log of cortisol pg/mg of hair)		0.0306		0.0530
		(0.177)		(0.115)
Constant	1.566***	1.576***		
	(0.127)	(0.149)		
Observations	86	86	82	82
Likelihood-ratio test 2 vs. 1 & 4 vs. 3	$\chi^2(1)=1.66$		$\chi^2(1)=1.85$	
R-squared	0.091	0.092		
Number of individuals	43	43	41	41

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. In column 3 & 4, 2 groups (4 obs) are dropped because of all zero outcomes.

We start our analysis to the effect of lagged cortisol levels and perceived changes with a fixed effects OLS regression (within estimator). The rationale behind selecting fixed effects relates to the substantial within-individual variation observed in both changes experienced and stress, as highlighted in Table 4.1. Furthermore, a robust Hausman test (see Cameron & Trivedi, 2010, pg. 268) was conducted, and the null hypothesis was rejected ($\chi^2(1)=2.884$*), indicating that a fixed effects model is preferable over a random effects model in order to obtain consistent estimates.

To estimate the fixed effects panel model, the regression analysis focuses on the within-individual variations over time. This is done by taking the differences within each individual between different time periods. By subtracting the individual-specific mean or average from each observation, we effectively remove the individual-specific effects from the regression equation. This differencing process allows us to isolate the time-varying effects of the independent variables on the dependent variable while controlling for individual-specific factors that do not change. As a result, it is not necessary to include elements such as gender, personality traits, or other individual-level characteristics, as these factors remain fixed over the 9-month observation period. Similarly, the same principle applies to fixed organizational characteristics, such as culture or other enduring organizational traits. Importantly, the fixed effects analysis also absorbs any work-unit level differences in objective frequency of change.
This is because the unit and municipality participants worked at were fixed characteristics in our sample (participants did not change municipality, unit, or role during the data collection period). We can assume that at the granular level of the work unit, employees are exposed to the same change events. Consequently, the fixed effects approach enables us to control for the possibility that some participants

worked in a unit that effectively experienced more or less changes than others during the period of data collection. Another common analytical approach is to include dummies for the unit or municipality in which respondents work. Such dummies could be incorporated in a cross-sectional regression and would have provide us with more detailed information on the unit-level (such as, working in unit A is associated with higher perceptions of change frequency). However, in a fixed effects regression with panel data, adding such dummies would not be useful since these dummy-scores would remain fixed for our participants across the research period. Hence, the effect of these dummy variables is automatically controlled for by the panel fixed effects method applied in this study. In addition, Figure 4.2 still provides more detailed information on differences in perceived change at a unit-level. By including the individual-specific fixed effects, the model effectively accounts for these stable factors and focuses on capturing the variations within individuals over time, enabling us to identify the specific time-varying effects of the independent variable (cortisol) on the dependent variable (perceived change frequency).

We conducted two regression models to examine the relationship between stress and perceived changes. The first model included only the lagged stress variable, while the second model incorporated a squared term to account for the potential inverted U-shaped relationship observed in Figure 4.3. This relationship suggested a slight decline in the effect of cortisol levels above 20 pg/mg of hair on perceived changes. The results of the regression models are displayed in Table 4.3. In the first column, the inclusion of the lagged stress variable reveals a positive and (marginally) significant effect on perceived changes. This suggests that higher levels of stress are associated with a greater likelihood of perceiving additional changes in the workplace. Introducing a squared term, however, does not lead to a notable improvement in model performance. Intriguingly, the model explains approximately 9% of the variation in perceived changes, indicating that stress plays a role in shaping individuals' perceptions of workplace changes.

However, in order to enhance our analysis, we recognize that our dependent variable, the perceived number of changes, exhibits right-skewness. This is evident from the fact that the mean (2.56) exceeds the median (2). Moreover, it is important to note that the dependent variable represents a count of the number of changes experienced. Given these characteristics, it is appropriate to switch to a Poisson model. A Poisson model is a statistical approach specifically designed for analyzing count data. It accounts for the discrete nature of the data and accommodates the constraint that counts cannot be negative. The Poisson distribution assumes random occurrence of events and independence between the events. Consequently, applying a Poisson model enables us to capture the unique properties of count data. In light of these considerations, we utilize a Poisson model with fixed effects, also known as a Poisson individual-effects model, to analyze the data. The results of this model are presented in columns 3 and 4 of Table 4.3. Based on the findings from column 3, the Poisson model reaffirms that stress has a positive

and statistically significant impact on the likelihood of perceiving a change. This suggests that higher levels of stress are associated with an increased perception of changes in the workplace. However, the inclusion of the squared term in column 4 does not yield support, indicating that the relationship between stress and perceived changes is not best characterized by an inverted U-shape.

In summary, our results indicate that an elevated level of stress is linked to a higher perception of changes. Therefore, we can conclude that increased stress levels have an influence on how individuals perceive changes in the workplace.

Discussion and conclusion

The aim of this study was to shed light on the impact of civil servants' chronic stress levels on how they perceived objective change events in their workplace environment. Over a period of nine months spanning three data collection moments, we collected and analyzed hair cortisol measurements and survey data on change perceptions among civil servants of five municipalities in Belgium. Our findings reveal a significant association between chronic stress levels of civil servants and their perception of change frequency.

We contribute to the literatures on public sector change and employee stress and resilience in several ways. First, our analysis uncovered substantial variation among civil servants in their perceptions of the frequency of organizational changes that affect them. This finding aligns with previous research suggesting that subjective judgments on the value and impact of organizational changes can differ significantly among individuals (e.g., Kleizen et al., 2023; Kleiman et al., 2022). However, it is noteworthy that even when considering 'objective measures', such as the number and type of change events individuals experienced, a significant amount of variation persists. This observation highlights the complex nature of organizational changes and the multifaceted factors that contribute to individuals' interpretations and assessments of change frequency. This finding provides empirical support for the argument that any objective measure of change exposure will be inadequate to accurately predict civil servant responses to change (Loretto et al., 2010; Rafferty & Griffin, 2006; Rafferty & Jimmieson, 2017).

Second, we examined whether chronic stress is a factor that contributes to this unexpected variation in perceived frequency of change. Based on insights from COR-theory (Hobfoll et al., 2018) and the dual-process model of cognition (Kahneman, 2011), we argued that the resource depleting nature of chronic stress increases the chance of bias occurring in civil servant's judgement of change, since it causes an over-reliance on intuitive (system 1) thinking. Specifically, literature suggests a bias toward exacerbated

threat appraisals of change, making those who suffer from stress more prone to overestimate the occurrence of change (cf. Epel et al., 2018; Bar-tal et al. 2013; Mogg et al., 1990). Our results confirm that chronic stress indeed increases civil servants' likelihood to perceive organizational change. This supports our hypothesis and aligns with our theoretical assumption that chronic stress – by depleting personal resources – interferes with threat appraisals and leads to a bias in perceived frequency of change. Moreover, the analyses reveal that the chance of stress-induced bias increases relatively quickly, as soon as chronic stress levels start to rise from low to moderate levels.

This finding adds specifically to the public sector change literature, which had developed a strong body of evidence on the accumulative effects of (particularly intense) change processes on employee stress and stress-related outcomes (Kleizen et al., 2018; Taylor, 2023; Wynen et al. 2020), yet remained largely silent on how accumulated and chronic stress levels impact employees' perceptions of ongoing change initiatives. Our results hint at the potential of a mutually destructive and cyclical relationship between chronic stress and organizational change. Intense change may instill stress in civils servants which makes them more likely to overestimate – and hence negatively appraise (Lazarus & Folkman, 1984) – the frequency and impact of ongoing change, further adding to existing stress levels, etc. Furthermore, since extant literature has demonstrated the negative effects of change-related stress on a variety of outcomes such as absenteeism, defensive silence, turnover intentions, innovation etc. (Wynen et al., 2021), a precise understanding of the change-stress dynamic becomes even more paramount.

This brings us to the implications for the practice of change management in the public sector. When civil servants' have differing opinions on aspects of change typically considered to be objective (i.e. frequency), it becomes increasingly difficult to inform and engage all of them with a single change strategy. Managing factors that fuel this subjectivity can be one possible strategy to facilitate change management. This study shows that chronic stress is a factor that contributes significantly to variations in change perceptions, and more specifically, that it causes a bias in civil servants' perception of change frequency. While a certain degree of subjectivity is inherent to our interpretation of events and is not necessarily problematic, a systematic bias in perceptions is more likely to cause problems. This is because bias 'distorts' perceptions in one particular -often negative- way, and is irrational in nature (i.e. not a logical consequence of circumstance) (Baron, 2008). Consequently, most change managers may be unaware such bias exists and are likely to overlook this issue when developing change interventions. While bias is in its nature irrational, we should note that the resulting attitudes and behaviors are not always irrational or maladaptive (Marshall et al., 2013). In certain conditions, cognitive biases can influence our thought process in a positive way and help us make optimal decisions. However, in case of chronic stress and persistent bias toward threat, this is more likely to become maladaptive and detrimental to individuals' functioning and

wellbeing at work (Epel et al., 2018). Moreover, by causing bias, chronic stress may add to the natural variation in individual's change perceptions to the point that these differences become extremely difficult to manage. Hence, ongoing efforts to help civil servants manage their stress levels can be essential in preventing that differences in change perceptions become unmanageable. Such efforts could consist of improving work-life balance by providing flexible work arrangements, offering civil servants more opportunities to balance demands at work and at home (Haley & Miller, 2015). Walinga & Rowe (2013) also noted the value of stress-reappraisal techniques to strengthen civil servants' capacity to deal with the complexity of public sector work settings. By investing in trainings or workshops that teach civil servants to reappraise stressful sources or to adopt a 'stress is enhancing' mindset, they can learn to focus more on positive information, thereby improving their long-term well-being and overall functioning (Walinga & Rowe, 2013). Stress reappraisal techniques could therefore also be instrumental in preventing stress-induced, negative bias in civil servant perceptions of organizational change. Finally, strategies for stress management can also contribute to a more holistic change management approach and complement specific change management interventions that often tend to be more ad hoc and remedial in nature (Burnes & Jackson, 2011).

Meanwhile, individual differences in change perceptions cannot be avoided entirely and will always exist to some extent. Therefore, it seems necessary to also implement more personalized change management strategies. In practice, we can notice some efforts to tailor change management strategies based on the department, role, or job level employees hold (DiLeonardo et al., 2020). Yet, our results show that - even when we control for such factors through fixed effects analysis- employees' perception of change events still differed significantly. Hence, this study suggests that change management strategies should also be personalized on a more fundamental level, based on the way employees perceive change. Communication and participation requirements will likely differ for employees depending on how they habitually view organizational change. Those employees that by default view change as threatening may benefit primarily from interventions that address uncertain aspects of change, rather than interventions requiring active participation in change trajectories. Such insights could be gathered from periodic employee surveys, or through annual evaluations that incorporate employees' assessment of workplace changes.

In addition to its practical implications, this article makes a valuable methodological contribution by incorporating a physiological measurement of stress (cortisol). By employing this objective measure, the study helps address concerns related to common-method bias. However, it is important to acknowledge some limitations of this research. First, our measure of change frequency captures the number of different types of change respondents perceived, but it does not account for specific types of change occurring more than once. However, since the time frame between measurements is short (3 months), it is unlikely

for any type of change to have occurred more than once. Second, while our methodological approach strengthens the causal claims made in this study, the design based on only three waves hampers the analysis of true causality, such as employing Granger causality. Thus, caution is warranted when drawing definitive causal inferences. Nevertheless, this study demonstrates that chronic stress can influence civil servants' perceptions of the frequency of workplace changes and the perceived threat associated with them. Rather than denying previous (public) management studies that framed stress as a result of threat appraisals of organizational change, this research adds to the existing literature by highlighting the possibility of a reverse relationship. Future research could explore the underlying mechanisms through qualitative designs to gain a deeper understanding of this effect.

Conclusion

In light of the increasingly turbulent operating context and growing pace of change confronting the public sector, this dissertation set out to answer an acute question that has emerged from the findings of recent studies on public sector change. It examined whether repeated change paradoxically undermines public sector adaptability by triggering a rigidity response in civil servants. This potentially paradoxical effect of repeated change is indicated by recent studies finding a link between frequent organizational change and negative outcomes such as reduced civil servant creativity, input, and innovative capacity (Wynen et al., 2017; 2019; 2020; Kleizen, 2019; Van Hootegem et al., 2019). While these results point at cognitive and behavioral inflexibility that are characteristic of a threat-rigidity response (Kleizen 2019; Olsen & Sexton, 2009), the authors called for further research to validate the occurrence of threat-rigidity effects following frequent organizational change, and to explore temporal dynamics and the potential exacerbation of effects following the introduction of additional changes (Kleizen, 2019). This dissertation responds to their call by gathering more robust evidence of threat-rigidity effects following frequent public sector change. It does so by examining the impact of repeated organizational change on three variables; role clarity (article 1), centralization of decisions-making (article 2), and proactive work behavior (article 3). While various indicators may be used to operationalize the effects described by threat-rigidity theory, these three variables were chosen since they allow to test for the occurrence of the two core dimensions of threat-rigidity – constriction of control and restricted information processing- at each level of analysis (i.e., the individual, the team, and the organization). In addition, they cover both behavioral and cognitive aspects described by threat-rigidity theory. The use of quasi-experimental and longitudinal designs serves to strengthen the causal inferences.

Finally, the fourth article of this dissertation served as a critical assessment of the suitability of threat-rigidity theory to uncover individual-level effects of frequent organizational change. It examines whether civil servants suffering from chronic stress have deviating perceptions of the frequency (and threatening nature) of organizational change. As such, it challenged threat-rigidity theory which frames stress as a result of perceived threat.

The following section summarizes and integrates the main findings of the different articles to arrive at a general conclusion concerning the main research questions of this dissertation. Subsequently, the theoretical, methodological, and practical contributions of our results are discussed, as well as the limitations encountered throughout the research articles. Finally, several concluding remarks are presented.

Does repeated change impact role clarity of civil servants?

Article 1 examined the impact of civil servants' perceptions of change complexity on their levels of role clarity. Analysis of APS (Australian Public Service) data revealed that ca. 25% of respondents experienced more than four different types of change during the short period of one year, indicating that high change complexity is a reality for many civil servants. Results confirmed our hypothesis and showed that civil servants who experienced a period of high change complexity – meaning at least four[10] types of change in the past year- reported significantly lower levels of role clarity compared to those who experienced minor change complexity. Moreover, further analysis revealed that as change complexity rises (up to seven or eight simultaneously occurring change types) role clarity will continue to decrease. This indicates that civil servants do not at some point become immune to change but that each additional change continues to undermine their role clarity.

A particular strength of this study is that it accounts for endogeneity issues by employing a quasi-experimental approach known as propensity score matching. This is essential to allow for a valid comparison of role clarity between those who experienced high change complexity (i.e. our treatment group) and those who did not (our control group). It ensures that only those respondents are compared that score similar on all covariates (such as agency type, agency culture, education, and job level) but change complexity. This approach revealed that those who dealt with a negative agency culture were more prone to experience high change complexity. This is not surprising since organizational change is often introduced to alleviate existing organizational problems, reflected in poor agency culture (Brunsson, 2009, Abrahamson, 2004). After controlling for the effect of pre-existing problems (agency culture) by incorporating it as a matching argument, we find a slightly reduced but still significant difference in levels of role clarity between those who experienced high change complexity and those who did not. This adds further nuance to our findings: pre-existing problems contribute to lower role clarity, however, when organizations start to (over) react by introducing more changes, it makes the problem worse. This raises a key concern for practitioners seeking to address organizational problems through the introduction of more changes. Moreover, with extant research observing that role clarity is an important coping resource during organizational change processes, the finding that those very same processes undermine role clarity also presents important implications for change management (Saksvik et al., 2007). It indicates that change managers should prioritize addressing role ambiguities that arise during complex change trajectories, to facilitate employee coping early on.

[10] Perceived change complexity had a right-skewed distribution.

The results of this study offer support for change-induced threat-rigidity effects. They indicate that complex change trajectories restrict information processing at the individual level. As civil servants become more withdrawn and hold on to familiar beliefs and prior knowledge, they are less likely to seek clarification on roles that evolve quickly in organizations undergoing constant change. Especially when change trajectories are complex -with structural, task-related, and strategic changes occurring simultaneously- role information can soon become outdated and new role expectations no longer align with employees' existing understanding of their role. At the organizational level, reduced role clarity seems to point at both restricted information processes and a constriction of control. When different types of change need to be implemented in a short period of time, APS managers may have dealt with such stressful circumstances by centralizing control and limiting decision-making to a small number of actors. Such a rigidity response from management entails fewer employees can participate in decision-making, making it difficult to clarify role expectations. At the same time, managers' tendency to restrict and simplify communication may further contribute to role ambiguity among lower-level employees. It should be noted that threat-rigidity theory predicts that a constriction of control will also be accompanied with increased formalization of procedures, which certain studies have linked to increased role clarity (e.g., Katsikea et al., 2015). However, our results indicate that, even if formalization did occur, it did not outweigh other threat-rigidity effects that were expected to undermine role clarity.

Does repeated change impact the degree of centralized decision-making?

Article 2 examined the impact of repeated change on the degree of centralized decision-making, which was operationalized through perceived autonomy at the individual and the team-level. A high level of both types of autonomy indicates decentralized decision-making, while low levels of both indicates more centralized decision-making (Lambert et al., 2006). Using data from the Belgian agency case, we tested two alternative hypotheses based on two competing theories: one predicting increased centralization in line with threat-rigidity theory (Staw et al., 1981), the other predicting decreased centralization based on crisis flexibility theory (Barnett & Pratt, 2000). Our results revealed that change intensity had a significant negative impact on respondents' job-autonomy, offering support for threat-rigidity's prediction that managers will constrict control and centralize decision-making, leaving less room for employees to participate in decision-making (Staw et al., 1981). However, change intensity had a positive effect on team-autonomy, indicating that the more changes respondents experienced, the more autonomy their team had. At first glance, these results seem to support a crisis flexibility model, in which management is expected to become more open to input from other employees, making decision-making more inclusive and decentralized when confronted with a threatening situation (Barnett & Pratt, 2000; 't Hart et al.,

1993). However, Staw et al. suggested that - in a decentralized organization - a threat may induce a control response that dissolves weak links to the top while strengthening intra-unit links. They remarked that under these conditions, a constriction of control may be more likely to play out at the level of work units (i.e. groups or teams). Since we find that a decrease in individual-level autonomy is accompanied with an increase in team-level autonomy, this may be indicative of a constriction of control unfolding at the team-level, with autonomy shifting from the individual towards that of the unit.

Considering that the agency under study was introducing shared team leadership with teams having a considerable degree of decision-making authorities, our results seem to confirm Staw's suggestion of a constriction of control primarily unfolding at the unit-level. In a more recent review on threat-rigidity, Slyngstad (2016, p.3) also noted that "the conventional focus on bureaucratic decision-making in threat-rigidity research ignores the emergence of network-based organizations and spuriously assumes that organizations possess a single, formalized locus of decision making." Our results indeed indicate that teams have become increasingly relevant decision-making loci in the agency since its de-bureaucratization efforts. Slyngstad (2016, p.3) adds that "it is important, then, to consider centralization around informal as well as formal leaders, and to conceive of threat-rigidity more generally as the strengthening of tight couplings around those with perceived expertise." We have speculated in this article that similar dynamics might be at play in the teams of the agency. The drainage of autonomy from the individual to the team indicates that respondents have sacrificed individual autonomy in favor of shared decision-making with team members. However, in practice, informal group leaders often emerge, resulting in the majority of team members conforming to the decisions made by a select number of individuals. Accordingly, the findings of this article still largely support the occurrence of a constriction of control, typical of threat-rigidity. Due to the decentralized nature of the agency under study, this effect seems to be concentrated at the team-level rather than the organizational level.

Does repeated change impact civil servant proactivity?

Article 3 examined how civil servants' past change experiences affect their ability to behave proactively in response to new changes. The analyses were performed with longitudinal data comprised of two survey waves held at a Belgian government agency. Proactivity was conceptualized as a problem-focused form of coping employees may use to cope with stressful aspects of organizational change. Results showed that respondents indeed used this coping strategy in response to new changes they experienced over the last year. However, this increase in proactivity was limited to those employees who had experienced few changes in the past. These results aligned with our expectations based on COR-theory, confirming that

individuals who already faced many changes in the past will favor more defensive behavioral strategies that require less effort and involve less risk.

With increasing turbulence confronting the public sector, new attitudes and skills are required to achieve a civil service that is fit-for-purpose today and in the future (OECD, 2017). Proactivity is one such characteristic that has come to the fore as a key prerequisite for modern civil servants (Sørensen & Torfing, 2011; Kruyen & Van Genugten, 2020; Christensen & Lægreid, 2011), featuring in government competency frameworks of countries such as Belgium, the Netherlands, the UK and Australia (FOD BOSA, 2018; BZK, 2021; CSHR, 2018; NSWPSC, 2020). At first glance, civil servant proactivity may conflict with established public service values such as honesty, trust, fairness, impartiality, etc. (Pollitt, 2003; Christensen, Laegreid, & Stigen; 2006). However, proactivity as defined in article 3 refers to any self-starting, future-oriented behavior that is aimed at improving one's work (Grant & Ashford, 2008). Hence, proactive actions may be as 'small' as making suggestions and raising concerns to prevent future issues, or proactively investing in network relations. These behaviors can be enacted without compromising on trust, fairness and other key values. Considering the need for more flexible and adaptable public personnel (Christensen & Laegreid, 2011), we adhere to the more optimistic view that proactivity may supplement rather than undermine traditional values, by increasing responsiveness and efficiency (cf. Christensen et al., 2006). Additionally, extant research shows that proactivity makes up an essential part of public organizations' learning culture (Eldor & Harpaz, 2019). Such a culture, in which mistakes, obstacles, and ongoing challenges are openly discussed and resolved, presents a powerful tool in encountering the challenges before the public sector today (Eldor & Harpaz, 2019). While organizational changes are often aimed at achieving an adaptable workforce, our results show that when civil servants become overwhelmed with change the exact opposite may be achieved. When civil servants stop behaving proactively in response to changes, the long-term adaptability of public organizations is threatened. Moreover, public management scholars increasingly emphasize that civil servants are not merely passive recipients of change, but that they also actively contribute to the success of change initiatives (Oreg et al. 2018, Ahmad et al. 2020). McDermott et al. (2013) showed how civil servants can move beyond the role of 'first-order' policy recipients to become 'second-order' change agents who proactively adapt and add to policy initiatives to suit local contexts. Considering our results, careful planning and temporization of change is needed to ensure civil servants can live up to their full potential as agents of change.

Our finding that civil servants who already experienced many changes in the recent past are less proactive when confronted with new changes, points at individual-level threat-rigidity effects. It indicates that excessive change causes civil servants to fall back on habitual behaviors (i.e. constriction of control) and

beliefs about their work environment (i.e. restricted information processing), which runs counter to proactivity.

Does chronic stress impact civil servant perceptions of change frequency?

The fourth article examined whether chronic stress in civil servants impacts their perception of the frequency of workplace change. Analyses were performed with 3-wave panel data, consisting of survey measures of change perceptions and measures of the stress hormone cortisol. Data were collected from Belgian civil servants of five municipalities. First, our results revealed that civil servant perceptions of change frequency – even in small municipalities- can vary substantially. This finding aligns with previous studies suggesting that subjective judgments on the value and impact of organizational changes can differ significantly among individuals (e.g., Kleizen et al., 2023; Kleiman et al., 2022). However, it adds to these insights by showing that -even when considering 'objective measures' of change such as number and type- individual accounts of change remain highly subjective. This article thus provides empirical support for the argument that any objective measure of change exposure will be inadequate to accurately predict civil servant responses to change (Rafferty & Jimmieson, 2017).

Second, our findings revealed that chronic stress is a factor that contributes to this unexpected variation in perceived frequency of change. This confirmed our theoretical expectation that the resource depleting nature of chronic stress increases the chance of bias occurring in civil servant's judgement of change. Specifically, it aligns with literature suggesting that chronic stress causes a bias toward exacerbated threat appraisals of change, making those who suffer from stress more prone to overestimate the occurrence of change (cf. Epel et al., 2018; Bar-tal et al. 2013; Mogg et al., 1990). Interestingly, our analyses reveal that the chance of a stress-induced bias increases relatively quickly, as soon as chronic stress levels start to rise from low to moderate levels.

While the public sector change literature has developed solid evidence on the cumulative effects of change on employee stress and stress-related outcomes (Kleizen et al., 2018; Taylor, 2023; Wynen et al. 2020), it lacked evidence on how accumulated and chronic stress may impact employees' perceptions of ongoing change initiatives. This article addresses this gap by showing that personal characteristics, such as one's sensitivity to develop chronic stress, may fundamentally alter one's perception of the occurrence of workplace changes. Specifically, the methodological design of this study allowed us to conclude that pre-existing (chronic) stress also has an impact on civil servants' perception of the amount of change they recently experienced. This indicates that repeated change does not pose a similar level of threat to each

civil servant and explains why we can see large variation in how civil servants deal with such circumstances (Smollan & Pio, 2017; Oreg et al., 2011).

This article also offered important implications for public sector change management, by revealing that civil servants can have differing opinions on aspects of change typically considered to be objective (i.e. the number and types of change that occur). This presents particular challenges for change management, calling into question the effectiveness of a single change strategy to inform and engage all employees. Managing factors that fuel this subjectivity, such as chronic stress, can be a key strategy to facilitate change management. Efforts to manage chronic stress can consist of improving work-life balance by providing flexible work arrangements (Haley & Miller, 2015). Walinga & Rowe (2013) also noted the value of stress-reappraisal techniques to strengthen civil servants' capacity to deal with the complexity of public sector work settings. This not only improves long-term well-being but can also help prevent stress-induced, negative bias in civil servant perceptions of organizational change. Programs for stress management can thus contribute to a more holistic change management approach and complement specific, ad hoc change management interventions (Burnes & Jackson, 2011). In addition, this article also highlighted the need for more personalized change management strategies. Our results indicate that merely tailoring change management strategies based on the department, role, or job level employees hold (DiLeonardo et al., 2020) may not suffice. Communication and participation requirements will likely differ for employees depending on how they habitually view organizational change. Those employees that by default view change as threatening (and perceive more of it) may, for instance, benefit less from interventions requiring active participation. Such insights could be gathered by incorporating employees' assessment of workplace changes in periodic employee surveys or evaluations.

Overall conclusion on the impact of repeated change on public organizations' adaptability

The main research question this dissertation seeks to answer is how repeated organizational change affects the ultimate adaptability of public organizations. The results from the first three articles confirm that repeated change -as perceived by civil servants – causes them to respond with rigidity rather than flexibility. We find that the more changes civil servants experienced, the less clear they were about their role at work (article 1), the less individual autonomy they had (article 2), and the less proactively they behaved at work (article 3). These results offer empirical support of the cognitive and behavioral inflexibility that are characteristic of a threat-rigidity response, as described by theory (Bommer & Jalajas, 1999; Olsen & Sexton, 2009). Moreover, this PhD revealed important temporal dynamics underlying threat-rigidity effects which remained missing in previous studies on threat-rigidity and public sector change (Kleizen, 2019). Specifically, article 1 revealed that each additional change continued to

undermine civil servant's role clarity. Hence, even when civil servants are confronted with change continuously, they do not seem to be strengthened by these previous experiences nor does it make them better prepared to face subsequent changes. Similarly, article 3 demonstrated that civil servants who already experienced many changes in the past no longer behave proactively when confronted with new changes. These findings indicate that, rather than building resilience, civil servants continue to experience cumulative, detrimental effects of repeated organizational change (cf. Moore et al., 2004; Grunberg et al., 2008).

What do these results imply then for public organizations' adaptability? Is a threat-rigidity response by default maladaptive? Staw et al. (1981) argue that a rigidity response is not necessarily dysfunctional but that this is highly dependent on the nature of the threat and environment organizations face. They propose that a rigidity response may successfully reduce threat if the tasks one is expected to perform, or the learning environment have not changed drastically. However, in an unstable and radically changing environment, they predict a rigid response will be inadequate as restrictions in information and control hinder adaptation to new environmental conditions (Staw et al. 1981: 502–3). In a public sector in which turbulence has become endemic (Ansell et al., 2023), adaptation to new environmental conditions is precisely what drives organizations to change. As reported by the OECD (2017, p.13), today's civil servants have to address problems of unprecedented complexity in societies that are more pluralistic and demanding than ever. At the same time, the systems and tools of governance are increasingly digital, open, and networked. Accordingly, civil servants face unseen pressures to keep up and develop new skills centered on adaptability and flexibility. In such circumstances, we agree with Staw et al. (1981) that sticking to what one already knows and does well is, at best, a mixed blessing. Moreover, recent studies on public sector adaptability amidst turbulence also emphasize the need for "negotiated knowledge, experimentation, revision, and proactive innovation" (Ansell et al., 2023, p.10), and for leaders who "accept cognitive dissonance, learn from experience, adapt to new circumstances, and look for next practice rather than being seen to apply a non-existing best practice" (Ansell et al., 2021, p.955). These features seem in direct conflict with our findings. Instead, our results show that at the individual level, many civil servants deal with turbulence in the opposite way: Rather than showing flexibility and proactivity, they revert to rigid, familiar patterns of thought and behavior. Finding compounding rigidity-effects in civil servants on both a cognitive and behavioral level, our research indicates that repeated change casts public organizations in a maladaptive cycle of threat-rigidity effects rather than promoting functional adaptation to their environment. Accordingly, this dissertation concludes that repeated change paradoxically undermines public organizations' capacity to adapt.

Importantly, results from the fourth article revealed certain limitations when applying threat-rigidity theory to explain and predict civil servant responses to repeated change. We found that chronic stress in civil servants causes them to have an increased perception of changes in the workplace. This adds another perspective to scholars' previous application of threat-rigidity theory (e.g., Terry & Callan, 2000; Wynen et al., 2022), by revealing that frequent change does not necessarily lead to a uniform experience of threat and stress. Rather, pre-existing levels of stress also seem to impact how much change civil servants perceive. This finding hints at a mutually destructive and cyclical relationship between chronic stress and civil servants' perception of change. It also aligns with Lazarus and Folkmans' (1984) suggestion that, in ambiguous circumstances, perceptions of workplace events may be more a function of personal characteristics -such as one's sensitivity to stress- rather than objective situational parameters. This offers important implications for the study of organizational change and employee reactions to it. It confirms that a focus is needed on individual perceptions of change rather than objective measures of change, especially in research studying employee reactions to frequent change, a situation that is characterized by high and persistent levels of ambiguity (Rafferty & Griffin, 2006). Finally, these results indicate that change management strategies based on objective measures of change may be tailored to a reality that does not align with that of many civil servants who suffer increasingly from chronic stress (Taylor, 2023).

Theoretical, methodological, and practical contributions

Theoretical contributions

By examining how repeated organizational change impacts civil servant behaviors and attitudes, this dissertation adds to the extant theoretical knowledge on the micro-level effects of repeated reform. Recent studies have found a number of unintended side-effects, such as a rise in absenteeism and presenteeism, and reduced capacity for innovation, and suggested threat-rigidity effects may lie at the root of these findings (Wynen et al., 2017; 2019; 2020; Kleizen, 2019; Van Hootegem et al., 2019). Yet, robust empirical evidence of repeated change causing a threat-rigidity response in civil servants remained lacking. This PhD answers the call for future work on repeated change to gather further evidence and investigate variables related to threat-rigidity, such as uncertainty, stress, centralization, and scanning behaviors (Kleizen, 2019: 244). To do so, this dissertation examined the impact of repeated change on role clarity (article 1), centralization of decision-making (article 2), and proactive work behavior (article 3). Together, these variables enabled us to test for the cognitive and behavioral inflexibility predicted by threat-rigidity theory. Meanwhile, this PhD also acknowledges the limitations of threat-rigidity theory. While the theory helps us understand how individuals, groups, and organizations respond to threats, it also assumes that a situation is uniformly perceived as a threat, implying that a situation is either

threatening or it is not, leading to stress or not. Similarly, previous applications of the theory in public administration were based on the reasoning that more frequent change (automatically) intensifies perceptions of threat among civil servants, leading to more stress and detrimental coping behaviors. However, extant research demonstrates that even when people are confronted with the same situation, they may interpret and cope with it very differently (e.g., Zacher at al., 2021; Avero et al., 2003). Hence, threat-rigidity theory leaves us wondering what precisely causes situations to be perceived as more or less threatening, and how this may lead to individual differences in stress responses and coping behaviors. This dissertation turned to Lazarus and Folkman's model of stress and coping (1984) and conservation of resources (COR) theory (Hobfoll, 1989) to better understand what contributes to individual perceptions of threat, and how civil servants coping behaviors may differ. Both theories share with threat-rigidity the notion that threat is a key antecedent of stress but offer a better understanding of how subjective experiences of threat arise, and what types of coping behaviors may ensue. In addition, both COR as well as Lazarus and Folkman's model offer specific perspectives on temporal dynamics underlying the stress and coping process, which are not addressed in threat-rigidity theory.

COR-theory helped us better understand how the resource-depleting nature of incessant change may be responsible for the rigid, conservative behaviors predicted by threat-rigidity theory (article 3). By highlighting the progressive character of the resource-depletion process, the theory revealed how stress can become chronic in civil servants who experience repeated change (article 4). Lazarus & Folkman (1984) also offer important insights concerning temporal dynamics in stress and coping. They help us clarify how successful coping can become increasingly difficult in a context of repeated change, as the threat or challenge associated with one change is being coped with, the next change already presents itself. Accordingly, when an event such as change occurs in a chronic persistent pattern, allowing individuals no 'time off', this can lead to persistent perceptions of threat. Another key take-way from Lazarus & Folkman (1984) concerned the importance of personal characteristics when individuals appraise situations characterized by high ambiguity. Building on their argument, we proposed that individuals' perception of ambiguous situations such as repeated change – and the extent to which it poses a threat- will be more a function of personal characteristics than objective situational parameters (i.e. formal duration and sequence of change events, official outline of their impact, number of departments afflicted, number of stakeholders involved, etc.). This already offers some explanation as to why subjective perceptions of change exposure can differ significantly from objective accounts of change (Loretto et al., 2010; Rafferty & Griffin, 2006; Rafferty & Jimmieson, 2017).

Building on this assumption, the fourth article examined whether chronic stress may be such an individual characteristic that affects civil servant perceptions of the frequency of organizational change. As such, it

challenged the above-mentioned theories which frame stress as a result of perceived threat. Drawing from research in cognitive psychology and neuroscience, we argued that the relationship may also exist in reverse, since stress often leads to a distorted view of reality and affects our perception of events, including change (Bar-tal et al. 2013, Epel et al., 2018, Vernooij et al., 2008). Our findings indeed confirmed that civil servants suffering from chronic stress perceived more changes. These results indicate that stress itself can also lead to exacerbated threat appraisals of repeated change and reveal that chronic stress can cause civil servants to have differing views on aspects of change typically thought to be 'objective' (i.e., the number and types of change that occur). When combining our results with extant insights from the public sector change literature, we concluded there likely exists a mutually destructive and cyclical relationship between stress and perceptions of frequent change.

Methodological contributions

Besides the integration of different theoretical perspectives, the use of longitudinal and quasi-experimental approaches was crucial to arrive at a more fine-grained understanding of micro-level effects. By collecting and analyzing longitudinal data, this PhD responded to calls for a closer examination of temporal dynamics in threat-rigidity responses following repeated change (Olsen & Sexton, 2009; Kleizen, 2019). In the third article, we used data from two survey waves held at a Belgian government agency. First-difference analysis revealed that civil servants who had already experienced many changes at the first time of measurement (2021) behaved less proactively the following year (2022) compared to those who had only experienced little change. A crucial advantage of the first-difference estimator is that it allows us to minimize endogeneity issues. Endogeneity occurs when one of the independent variables of the regression equation is correlated with the unknown random error term (Wooldridge, 2002). This violation of the assumption of exogeneity (i.e. error term is uncorrelated with the independent variables) can lead to biased and inconsistent estimates of the relationship between the variables of interest, making it difficult to isolate the true causal effect (Wooldridge, 2002). A key source of endogeneity stems from omitted variable bias, occuring when a variable not included in the model relates to both the independent and the dependent (Hill et al., 2021; Wooldridge, 2002). When studying the impact of repeated change on behavioral outcomes, there likely remain several variables that influence both perceived changes (independent) as well as work behaviors (dependent), that cannot all be measured. Such omitted variables may consist of organizational characteristics (e.g. organizational culture) and individual characteristics (e.g. personality traits, educational background). For instance, failing to account for personality traits that affect both individuals' perception of changes and their proactive behaviors means endogeneity would be present and our estimated effect of perceived changes on proactivity would be distorted. Working with first-difference analyses offers a solution to this problem and is a commonly used

econometric method to control for endogeneity. By taking the differences between consecutive observations of variables (in our case two consecutive observations in 2021 and 2022), it effectively eliminates all time-invariant factors that are specific to each individual in our panel dataset, such as personality traits (which should not vary over a one-year period). By differencing the data, the fixed effects or all time-invariant characteristics of the respondents are thus eliminated, without the need to explicitly measure these or account for these in our model. Article 4 benefited from the same methodological strength, applying a fixed effects poisson regression to longitudinal (3-wave) data from local government. Using longitudinal designs strengthens the causal claims of this dissertation, and adds to extant (largely cross-sectional) evidence on the side effects of repeated public sector change (Wynen et al., 2017; 2019; 2020). In addition, article 4 presented a methodological innovation by using the biological marker hair cortisol to measure chronic stress, accumulated over the past three months (HCC analysis). This approach enabled us to mitigate several methodological challenges that often prevent researchers to accurately capture (chronic) stress. Stress is commonly measured using survey items that either measure stressful events or conditions in the work environment or asks about a respondent's subjective feelings of distress in the workplace (Ganster, 2008). However, such measurements only offer snapshots and are highly susceptible to momentary shifts in individuals' mood or affective states. Hence, they often fail to capture underlying stress processes leading to longer-term outcomes (Ganster, 2008). The use of a biological measurement of stress also mitigates issues of common-method variance and social desirability bias (Podsakoff et al., 2012). As noted in article 4, our cortisol measurement of stress not only reflects workplace distress but also captures distress stemming from respondents' private life. The notion that stress arises from the interplay between private life and work-related events is often underestimated in extant literature (Westman, 2013). In this respect, supplementing traditional (subjective) measures of stress with natural stress measurements can also add significant value to future research on workplace stress. Lastly, the approach taken in article 4 also raises interesting questions for future research on organizational change and prompts us to reconsider the importance that is traditionally attached to objective measurements of change.

Furthermore, article 1 made use of a matching approach to reveal that civil servants who experienced high change complexity suffered from lower role clarity compared to those who did not. This quasi-experimental method strengthens causal inferences by allowing us to construct a counterfactual (i.e. treatment and control group) (Heckman, et al., 1997). Whereas true experiments derive their internal validity through random assignment of individuals to either the treatment or control group, such randomization is not present in a quasi-experimental approach (Cook, Campbell, & Shadish, 2002). Instead, individuals are assigned by the researchers to one of both groups after data has been collected. In our case, we constructed both groups based on the amount of change complexity respondents

perceived (high vs. low). Matching entails that we only compare results between respondents who score nearly identical on all factors (such as gender, tenure, agency culture) but change complexity. This method ensured there were no systematic differences between both groups and allowed us to determine if and to what extent differences in role clarity between both groups could be attributed to high change complexity (e.g., Heckman, et al., 1997; Czarnitzki & Lopes-Bento, 2014). As previously mentioned, a common pitfall when studying the effects of change is the inability to determine whether detrimental outcomes are truly the result of changes, or another factor that explains both. In article 1, for instance, complex change as well as reduced role clarity could have stemmed from a poor agency culture and related issues. However, by incorporating agency culture as a matching argument, we mitigated its potential confounding effect. As such, this method serves as another important tool to strengthen the causal claims of this dissertation.

Finally, the use of different datasets spanning different regions and levels of government, contributes to the external validity of our findings (cf. Cook et al., 2002). We found evidence of threat-rigidity effects across federal government in Australia (article 1), as well as different government levels in Belgium (articles 2, 3, 4). This indicates that our results may be generalizable to several other settings as well, since public organizations across the globe face the phenomenon of increased turbulence and constant change (Ansell et al., 2020; Cristofoli et al. 2022). Moreover, extant literature on the psychological mechanisms of stress and coping finds similar outcomes across different countries and cultures (e.g. Burke, 2010). This also indicates that the applicability our findings (based on the same psychological processes) should not be limited to the Australian or Belgian context.

Practical contributions

This dissertation offers several insights for practitioners of public sector change management. Of specific interest is that we find empirical evidence of the subjectivity of change experiences, and that it may be incorrect to assume a shared understanding of change events even when it concerns 'objective aspects' such as change frequency and type (article 4). Instead, we found that chronic stress can contribute to significant differences in civil servants' perception of the frequency of workplace changes. This implies that generic -one size fits all- change management approaches will not be the most effective. Rather, more may be gained from investing in stress management initiatives, since our results show that chronic stress exacerbates civil servant perceptions of change frequency. Such initiatives may consist of dedicated stress management interventions which focus on restoring resources that have been depleted by the work environment, or more preventive measures such as health promotion and wellness programs that enhance job and personal resources for all employees (Tetrick & Winslow, 2015). By preventing stress

levels from spiraling out of control, such initiatives can help ensure that differences in perceived occurrence of change remain manageable. They can also contribute to a more holistic change management approach, complementing specific change management interventions that are more ad hoc and remedial in nature (Burnes & Jackson, 2011). Nevertheless, our results indicate that some level of personalization of change management is required. Incorporating civil servants' assessment of changes in standard evaluation moments may help tailor change management strategies in terms of participation and communication requirements.

Results from articles 2 and 3 also provide valuable insights for practice, considering the context in which the data were collected. Both articles made use of data from the Belgian agency, which not only underwent a complex merger process but was also implementing principles of shared team leadership across the organization. Shared team leadership, with extensive collaboration across organizational units and decisions being driven bottom-up, is considered a key characteristic of agile and flexible organizations (Janssen & van der Voort, 2016, Mergel et al., 2021). In this sense, it turns traditional organizational principles of the bureaucracy upside down, since it goes against traditional control and command culture and requires great flexibility in organizational procedures and principles (Mergel et al., 2021). Despite challenges associated with its implementation, shared team leadership has become increasingly popular in public sector work settings (Mohagheghi & Lassenius, 2021; Vacari & Prikladnicki, 2015). Interestingly, our articles based on the Belgian agency data still point at the presence of threat-rigidity effects, despite the agency's decentralization efforts. Specifically, results from article 2 indicate that the agency is still experiencing rigidity effects but that these are now concentrated at the level of the teams. This is reflected in the simultaneous decrease of individual autonomy and increase in team-level autonomy. In addition, article 3 demonstrated that the agency's employees who experienced intense change responded with rigidity / passivity when confronted with new changes, despite the increased flexibility in the agency's structure. By hindering respondents' capacity to respond proactively, intense change likely also undermined their ability to act as agents of change (cf. Ahmad et al. 2020; McDermott et al., 2013). Hence, our findings show that intense change trajectories – even when they are centered on decentralization and agility- can still undermine public organizations' capacity to adapt. While these results stem from only one organization, it does call into question recent arguments that flatter, modularized organizations tend to adapt better to new and emerging demands than large, compartmentalized hierarchies (Ansell et al., 2021).

Furthermore, article 1 revealed that civil servants struggled to build resilience in the face of intense change, with each additional change they experienced leading to more detrimental effects on role clarity. Since extant research identified role clarity as an important coping resource during organizational change

processes, the finding that those very same processes undermine role clarity presents important implications for change management (Saksvik et al., 2007). It indicates that change managers should prioritize addressing role ambiguities early on in change trajectories to facilitate employee coping. It also emphasizes the importance of adequate change communication as a tool to work through the ambiguity associated with organizational change. At minimum, there should be clear communication on the reasons for, and the overall objectives of a change (Palmer, 2012).

Lastly, our findings also point at the importance of considering civil servants' change history. Organizational change does not occur in a vacuum. New changes often interact with earlier change initiatives (Bartunek et al., 2006) and – especially when they clash with previous change efforts, norms and traditions – can cause widespread change resistance among employees (Bordia et al., 2004). This dissertation further emphasizes the need to consider civil servants' past experiences with change and the need for sustained, consistent change management efforts across time.

Limitations and avenues for further research

A first limitation relates to the overarching theoretical framework used to answer the research question: threat-rigidity theory. The multilevel nature of threat-rigidity theory is what enables us to 1) examine how repeated change impacts individual civil servants, and 2) to link these individual-level effects to organizational outcomes – i.e. organizational adaptability. However, as admitted by Staw et al. (1981, p.502), the multilevel nature of treat-rigidity theory also brings with it some "slippage in definitional precision" and challenges in operationalizing these effects across levels of analysis. At the same time, they remark that such ambiguity is inevitable when searching for parallel and molar effects that span different levels of analysis. Similarly, various authors have noted that model operationalization is one of the key difficulties of implementing multilevel theories (e.g., Klein & Kozlowski, 2000; Ballard et al., 2019). The inherent complexity of such theories, which often describe multiple subprocesses that interact reciprocally over time at different levels of analysis, makes them difficult to test (Ballard et al., 2019). While ambiguity in definitional precision may explain why there is a paucity of reliable, valid, and generalizable survey measurements of threat-rigidity (Slyngstad, 2016), this appears to be a limitation of most theories that integrate different levels of analysis (Klein & Kozlowski, 2000; Ballard et al., 2019). Hence, while carefully chosen, our variables (autonomy, role clarity, proactivity) may still be considered proxies of threat-rigidity effects. Nevertheless, article 2 arguably offers the most direct measurement of threat-rigidity effects: by measuring different levels of autonomy we obtain a nearly direct measurement of the constriction of control dimension, since autonomy is a key dimension of centralized decision-making (e.g. Lambert et al., 2006).

A second limitation concerns the use of different labels for the same change measure. All articles rely on a similar survey question to measure change, asking respondents to indicate the different types of organizational change they recently experienced (ranging from the past three years, the past year, to the past three months). Yet, this measure was operationalized in slightly different ways throughout the various articles, including elements of frequency (article 4), intensity (article 2), as well as complexity (article 1). For each article, a concept/label was chosen according to the aspect that was emphasized in that article's theory. For the article on role clarity, for instance, we wished to emphasize the complexity posed by many different types of change occurring in a short period of time. This most closely aligns with the article's theoretical framework which centers on the role of uncertainty and highlights how a rapid sequence of diverse types of change can impact employees' role and their understanding of it (Bordia at al., 2004). On the other hand, in article 4, we emphasized the frequency dimension of our change measure. This most closely matches our theoretical argument that chronic stress leads employees to overestimate the threatening nature of change events, leading to an attentional bias and making them perceive more of it (cf. Bar-tal et al., 2013; Mogg et al., 1990). Lastly, article 2 maintains a more general operationalization of change, referring to the overall intensity of change. The theoretical framework of this article was built on threat-rigidity (Staw et al., 1981) and crisis flexibility theory (Barnett & Pratt, 2000), predicting opposite effects yet both starting from the notion of threat. Since both theories use a broad conceptualization of threat, a more general label for our measure of repeated change emphasizing its threatening nature was more appropriate.

A third limitation relates to the different datasets being used in this PhD, stemming from federal government in Australia (article 1), as well as different government levels in Belgium (articles 2, 3, 4). As mentioned, our evidence of threat-rigidity effects across these different regions and governmental levels can be considered a strength in terms of external validity (cf. Cook et al., 2002). The psychological stress mechanisms underlying our findings haven proven valid across different countries and cultures (e.g., Burke, 2010). Therefore, these factors do not feature prominently in this dissertation. Nevertheless, certain contextual factors could have influenced the strength of the effects identified in this research. At the macro-level, for instance, we must acknowledge that the type of administrative system and related cultural factors such as trust, individualism and uncertainty avoidance may influence results (Verhoest et al., 2012). For instance, both Belgium and Australia can be considered medium-trust countries. Results may be different in low or high-trust countries. However, prior research in a high-trust setting (Norway) suggests they are not spared from threat-rigidity effects (Wynen, et al., 2020). At the organizational level, factors such as organizational culture and substantive aspects of change trajectories could have made our results more case-specific than we would like (Burnes & Jackson, 2011). However, the first article

(containing data from all Australian federal agencies) controlled for cultural differences between agencies and still found evidence of threat-rigidity effects. Article 4 also controlled for cultural differences in the studied municipalities through the applied fixed effects approach. In addition, the case of the Belgian agency did allow for a more thorough understanding of substantive aspects of change and guided the interpretation of our findings on civil servant autonomy and proactivity (articles 2 & 3). Finally, it should be noted that – given their universal nature- the applied stress theories have been used to study employee outcomes in private as well as public sector organizations (Wynen et al., 2019; 2020; 2022; Van der Voet & Lems, 2022). Nevertheless, the political context in which government organizations operate, together with individual-level factors (i.e. public service motivation in civil servants) may lead to varying outcomes in civil servants compared to private sector employees.

A final limitation concerns the study design of article 2. To control for endogeneity, this dissertation made use of either longitudinal data or a matching approach. Article 2 was the only study that did not make use of longitudinal analyses (i.e. difference-in-difference, fixed effects) nor matching. Its reliance on a standard regression method increases the chance of endogeneity issues affecting the results (Wooldrigde, 2002).

The findings of this dissertation also present interesting avenues for future research. The aim of this PhD was to establish whether there is a cumulative, detrimental effect of continuous change on public organizations' adaptability. While our findings offered a diagnosis (confirming there is a effect), future studies can examine how these negative effects (i.e. rigidity) can be overcome. They may, for instance, focus on identifying the parameters that allow civil servants to overcome the turbulence of changes and still have a flexible attitude at work. Several dispositional factors may be instrumental for personal resiliency in civil servants, such as high levels of (internal) locus of control, change-related self-efficacy, and prosocial motivation (Ahmad et al., 2020). In addition, extant research indicates that leadership is an important contextual factor that can help civil servants maintain an open and active attitude in the face of change (e.g., Ancarani et al., 2020). Transformational and servant leadership in particular, seem effective in public sector settings to promote work engagement (Ancarani et al., 2020), and proactive, innovative employee behaviors (Strauss et al., 2009; Mostafa & El-Motalib; 2019; Hansen & Pihl-Thingvad, 2019). By inspiring and motivating employees through a shared vision, transformational leaders can encourage employees to go beyond their formal job requirements and take initiative (Strauss et al., 2009). Servant leaders, who see their main role as serving the needs of their employees, can foster proactivity by building their employees' sense of ownership and responsibility (Luo & Zheng, 2018). Besides leadership, factors such as trust, workplace climate and culture may also serve as important resources

that can boost civil servants' ability to overcome the turbulence of continuous change and prevent them from reverting to rigid coping responses (cf. Franken et al., 2022; Yean et al., 2022).

This dissertation focused on the aggregated impact of different changes experienced over (short periods of) time. However, for practice, it may be interesting to gain a more fine-grained understanding of the impact of different types of changes. Future research could try to identify if there are specific types of change that act as a lever and contribute disproportionately to threat-rigidity effects in public organizations. In addition, previous studies found that the perceived origin of change, as well the degree to which it aligns with previous change initiatives, can have a great effect on civil servants' attitude towards change. Change that relates well to previous reforms and that is perceived as originating from within the organization, tends to be accepted more easily by civil servants (Kleizen, 2019; Hargreaves, 2004). Conversely, imposed and discontinuous change initiatives can severely disrupt vested interests and self-initiated change processes, and can be perceived as illegitimate and frustrating by the public organization's senior management but also increase the risk of change resistance and other change-related side-effects among employees (Kleizen, 2019: p.224). Accordingly, we might see less of a rigidity response in organizations where civil servants believe that most of (recent) change initiatives come from within the organization itself, and do not radically oppose previous change efforts.

Concluding remarks

Nearly two decades ago, Brunsson (2009) posited that reforms had become 'routine' for public organizations, pointing to the never-ending supply of problems, solutions, as well as organizational forgetfulness as being key to the repetitive nature of public sector change. He explained that reforms, whether they are perceived as successful or not, tend to lead to the perception of new problems for which new reforms are needed. This constant flow of problems is accompanied with a constant supply of new, fashionable management solutions to better address said problems. Lastly, Brunsson argued that organizational forgetfulness on previous – often highly similar- change efforts and the reasons they failed contribute to the never-ending cycle of reforms confronting public organizations.

However, in the current era marked by increasing turbulence, public organizations must respond to problems presenting an unprecedented degree of uncertainty, complexity, and interconnectedness. Moreover, there is a greater plurality of ideas and expectations of what society should be, how government should behave, and what kinds of trade-offs between the individual and collective are desirable (OECD, 2017). Hence, today's problems often require radically different types of solutions that go beyond the latest management trends. Think of 'wicked problems', that require novel forms of

intensive public-private cooperation, as well as new governance systems that are increasingly digital, open and networked (OECD, 2017). It appears then that over the past decade, reforms have become much less a matter of routine. In such circumstances, we concluded that the identified threat-rigidity effects following intense change will undermine public organizations' capacity to adapt rather than strengthen it. Moreover, our results also challenged Brunsson (2006, p.249) on his notion of organizational forgetfulness and the idea that "forgetfulness helps people to accept reforms" and that "forgetfulness prevents the past disturbing the future". Instead, our results show that at the individual level, many civil servants do not forget about their prior change experiences and continue to experience detrimental effects both cognitively and behaviorally. This leads us to conclude that when it comes to repeated change and civil servants' adaptability, the past does disturb the future.

In his research on private sector change, Abrahamson (2000) developed the concept of dynamic stability as a key solution to address the detrimental effects of intense change. He explains that dynamic stability is centered on pacing, with big and small changes being implemented at the right intervals. Specifically, it entails that major change initiatives should be interspersed among carefully paced periods of smaller, organic change (Abrahamson, 2000). Similar recommendations have been formulated regarding the pacing of public sector change (Kleizen et al., 2018; Wynen et al., 2017; 2019; 2020), including in this dissertation. However, we must acknowledge that the turbulence confronting contemporary public organizations might not allow for such deliberately paced change. The careful orchestration of small and big changes, as proposed by Abrahamson, may be less feasible in public sector work settings characterized by a considerable degree of politically imposed change (Kleizen, 2019). Rather than trying to mold change into predetermined patterns, it seems more can be gained from increasing civil servants' capacity to deal with repeated change. Accordingly, we have suggested for future research to examine what factors can help civil servants develop resilience in the face of turbulent work conditions.

A final remark, however, adds to this perspective by cautioning against overly deterministic views on public sector change. Often, change is presented as something that is forced upon public organizations by the multitude of stakeholders they must serve, and the environmental turbulence they have to contend with (van der Voet, Kuipers, & Groeneveld, 2015). In this dissertation, too, we often revert to terms such as 'being confronted with', 'being subjected to' or 'undergoing' change. Public organizations indeed operate in a unique context, and public managers have less strategic autonomy than their counterparts in the private sector. Yet, the rise of networked modes of governance, for instance, can enable public organizations to take on a more active role in co-creating their environment and the changes taking place in it (Stoker, 2006). As such, networks can present a crucial tool for public organizations to initiate deliberate change in close cooperation with other key stakeholders. As findings from Kleizen (2019)

indicate, fostering perceptions of change as (at least partially) self-initiated significantly reduces associated perceptions of threat. Accordingly, if civil servants perceive that their role goes beyond that of passive recipients of change towards that of co-developers of change, threat-rigidity effects identified in this research may be reduced.

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Appendices

Supplementary materials article 1

Additional information operationalizations

Role clarity:

Based on your experience in your current job, please respond to the following statement:

I am clear what my duties and responsibilities are.

Answer categories: 1 – Always; 2 - Often; 3 – Sometimes; 4 – Rarely; 5 – Never

Change complexity:

Which of the following changes impacted your work group in the last 12 months?

[Select all that apply]

- Change in physical workplace (e.g. moved to a new building, existing workplace renovated)
- Machinery of government change
- Relocated to a new city
- Structural change (change in division or branch structure)
- Functional change (e.g. change in responsibilities)
- Change in work priorities
- Decrease in staffing numbers
- Increase in staffing numbers
- Change in SES leadership (e.g. change of branch head)
- Change in supervisor
- Other

General impressions of the agency (agency culture):

Please rate your level of agreement with the following statements regarding aspects of your agency's working environment: See survey items Table 1.5.

Answer categories: 1 – Strongly agree; 2 - Agree; 3 – Neither agree nor disagree; 4 – Disagree; 5 – Strongly disagree

Table 1.5. Construction of the index "General impression of the agency"

Survey Item	*Factor Loading*
I feel a strong personal attachment to my agency	0.6274
When someone praises the accomplishments of my agency, it feels like a personal compliment to me	0.5929
I am proud to work in my agency	0.6792
Change is managed well in my agency	0.7209
Internal communication within my agency is effective	0.7253
My agency deals with underperformance effectively	0.5773
My agency routinely applies merit in decisions regarding engagement and promotion	0.6593
My agency genuinely cares about employees being healthy and safe at work	0.7261
My agency supports employees who are injured or become ill due to work	0.6574
In general, employees in my agency feel they are valued for their contribution	0.7689
In general, employees in my agency effectively manage conflicts of interest	0.6218
In general, employees in my agency appropriately assess risk	0.6292
My agency has procedures in place to manage business risks	0.636
I know who to talk to in my agency about business risks that impact my workgroup	0.5967
My workplace provides access to effective learning and development (e.g. formal training, learning on the job, e-learning, secondments)	0.6093
My agency motivates me to help achieve its objectives	0.8195
My agency inspires me to do the best in my job	0.8008
I am satisfied with the opportunities for career progression in my agency	0.605
I would recommend my agency as a good place to work	0.7941
My workplace culture supports people to achieve a good work-life balance	0.6525
My agency actively encourages ethical behaviour by all of its employees	0.6703
I have confidence in the processes that my agency uses to resolve employee grievances	0.7297
My agency is committed to creating a diverse workforce (for example gender, age, cultural background, disability status, Indigenous status)	0.6182
Eigenvalue	10.58
Proportion	0.8436
N	7627

Additional information analyses

Detailed discussion of the matching approach:

Organizational change is often introduced to alleviate existing organizational problems (Brunsson, 2006). Therefore, malfunctioning organizations have a higher likelihood to experience change (and the more widespread perceived problems are, the more likely that more diverse changes will be implemented). Previous studies have failed to isolate the effect of change diversity from those of the pre-existing problems that said change was implemented to solve. To solve this issue, we make use of a matching approach (e.g., Dehejia & Wahba, 1999; Heckman, Ichimura, Smith, & Todd, 1998; Czarnitzki & Lopes-Bento, 2014). In the remainder of this section, some more detailed information is provided regarding the used econometric approach.

While there is no requirement to make any assumptions regarding the functional form and the distribution of the error terms, the matching approach only controls for observed heterogeneity among

those individuals having experienced a wide array of diverse changes over a limited period of time and those who did not. To address this, we did not simply compare those having experienced highly diverse change with all individuals that have not experienced such change. Instead, we compare them only with a selected group that has similar characteristics. Our problem can be described by the following equation:

$$E(\alpha) = E(Y^R \mid T=1) - E(Y^P \mid T=1) \qquad (1)$$

where Y^R represents the current, observed outcome variable (role clarity); and T refers to the treatment, whereby T=0 means that an individual did not experience a wide array of diverse changes, while T=1 means that they did. As evident, equation (1) only includes those individuals who experienced a high change complexity (T=1). Finally, Y^P is the potential outcome if the individuals who experienced highly complex change (T=1) would not have endured these events. The difference between the current, observed outcome, and the potential outcome reflects the effect of a high change complexity. However, the difficulty is that E(Y^P|T=1) cannot be observed and is a counterfactual situation that has to be predicted. The easiest solution would be to compare outcomes from individuals having experienced an array of diverse change events over a short period of time with those who did not. However, as discussed, one can assume that such change is not randomly assigned. For instance, employees in malfunctioning organizations will be more likely to endure organizational changes compared to employees in effective, efficient ones. Due to this selection bias, we assume the following:

$$E(Y^P \mid T=1) \neq E(Y^R \mid T=0) \qquad (2)$$

Hence, it is impossible to simply use the average role clarity from those individuals who did not endure highly complex change to predict the counterfactual situation (Czarnitzki & Lopes-Bento, 2014). This selection bias can only be overcome if both treated and non-treated individuals have the same likelihood of experiencing the treatment (highly diverse change events over a short period of time). This refers to the conditional independence assumption (CIA), which means that the treatment and the potential outcome are independent for individuals with the same set of exogenous characteristics (X; Aerts & Czarnitzki, 2004). If the CIA holds, it means that the difference between the outcome (role clarity) will not be linked to specific characteristics (e.g., caused by the malfunctioning organization), but can be attributed specifically to the treatment (experiencing highly diverse change over a short period of time). When the CIA assumption is fulfilled, it follows that:

$$E(Y^P \mid T=1,X) = E(Y^P \mid T=0,X) \qquad (3)$$

When applying this to our problem and initial equation, we see that the treatment effect can be written as:

$$E(\alpha) = E(Y^R \mid T=1, X=x) - E(Y^P \mid T=0, X=x) \qquad (4)$$

By conditioning on X, we eliminate selection bias caused by observable differences between employees having experienced highly diverse change events and those that did not experience such change.

To estimate the effect of a high complexity of change over a short time period on role clarity, we rely on caliper matching. Each individual who experienced an highly complex change is paired with the closest individual who did not experience such changes. The linking of individuals is built on the similarity of the probability of experiencing a high change complexity. We calculated a propensity score after a logit estimation on the dummy, indicating if one has experienced complex changes or not. In this way, we are available to avoid the "curse of dimensionality" as we use an index as the matching argument (Rosenbaum & Rubin, 1983). An index decreases the number of variables in the matching function, making it easier to create pairs but accounts for several matching arguments.

Moreover, we calculated the minimum and maximum of the propensity scores of the potential control group and deleted those observations with probabilities higher than the maximum and lower than the minimum in the control group.

To avoid "bad matches," we set a maximum distance between the treated and control group. This maximum is also called a "caliper." When a distance exceeds this maximum distance, the treaded observation is dropped from the sample to avoid bias (see also Czarnitzki and Lopes-Bento, 2014).

This matching procedure does, to some extent, account for endogeneity and causality issues by the inclusion of an individual's perception of the work unit. For instance, it is not unlikely that negative work perceptions may lead respondents to report more organizational changes as well as lower levels of role clarity. However, in that case they would also have a more negative perception of the workplace. As the matching procedure specifically accounts for the perception of the workplace and looks for similar individuals in both groups (with complex change and without such change), the role of the endogenous effect (in this case negative work perceptions) would be eliminated.

Supplementary materials article 2

Additional information operationalizations

Job autonomy:

The questions below ask about the autonomy you experience within your job today.

- I set my own work pace.
- I plan my own work.
- I determine how I perform my work.

Answer categories: 1 – Never; 2 - Rarely; 3 – Sometimes; 4 – Often; 5 – Always

Team-autonomy:

For the responsibilities below, indicate whether decisions about them are made by the team supervisor or others outside the team (such as a theme manager) or by the team members themselves.

- The planning of work (when we do which tasks)
- The distribution of work (who takes on which tasks)
- Managing the team's resources (e.g. for training)
- Providing feedback (addressing/praising certain behavior)

Answer categories: 1 - Decision by supervisor or others outside the team; 2 - Decision partly by others, partly by team members; 3 - Decision by team members themselves; 4 - I don't know

Change intensity:

Please indicate how many times you have experienced the following changes in the past three years. [Select all that apply]

- Change in physical workplace (e.g. moved to a new building)
- Change in function (taking up a completely new job)
- Change in job content and procedures
- Change in team composition (either colleagues or manager)
- Change in departmental structure (e.g. department ceases to exist)
- IT changes (e.g. introduction of new software programs)
- Other

Table 2.3. Factor analysis job-autonomy and team-autonomy

Survey item	Factor Loading
Job-autonomy	
I determine my own work pace.	0.590
I plan my own work.	0.560
I determine how I perform my work.	0.595
Eigenvalue	1.014
Cronbach's Alpha (Scale reliability coefficient)	0.659
Team-autonomy	
Planning of work.	0.398
Distribution of work.	0.618
Managing team resources.	0.661
Providing feedback.	0.628
Eigenvalue	1.371
Cronbach's Alpha (Scale reliability coefficient)	0.691

Additional information analyses

Table 2.4. Unweighted regression output for dependents job-autonomy and team-autonomy

Variables	Job-autonomy	Team-autonomy
Change intensity	-0.118**	0.0569
	(0.0378)	(0.0319)
Gender	-0.0844	-0.117
	(0.141)	(0.119)
Tenure (<5 years = ref cat.)		
5 - 10 jaar	-0.140	0.0121
	(0.180)	(0.152)
10 - 15 jaar	-0.153	-0.0374
	(0.175)	(0.147)
15 - 20 jaar	-0.140	0.0996
	(0.195)	(0.164)
20 - 25 jaar	-0.348	0.584**
	(0.249)	(0.210)
25 – 30 jaar	-0.0648	-0.0929
	(0.276)	(0.233)
30 – 35 jaar	0.0774	0.249
	(0.303)	(0.256)
> 35 jaar	1.160*	-0.0516
	(0.510)	(0.430)
Statute (civil servant = ref cat.)		
civil servant on probation	-0.663	0.385
	(0.557)	(0.470)
contractual	-0.138	0.266*
	(0.146)	(0.123)
contractual on probation	-2.075	-0.120
	(1.293)	(1.090)
Age	0.0179	-0.00733
	(0.0307)	(0.0259)
Managerial position	-0.350	-0.208
	(0.191)	(0.161)
Shared leadership	0.337**	2.575**
	(0.127)	(0.107)
Month (March = ref cat.)		
April	0.00915	0.108
	(0.128)	(0.108)
May	-0.0230	-0.0466
	(0.149)	(0.126)
Constant	12.04**	5.210**
	(0.520)	(0.439)
Observations	1,186	1,186
R-squared	0.026	0.440

Standard errors in parentheses
** p<0.01, * p<0.05

Table 2.5. Regression output for dependent team-autonomy, by team type

	Team-autonomy	
Variables	Traditional teams	Shared leadership
Change intensity	0.0863	0.0181
	(0.0468)	(0.0436)
Gender	0.155	-0.675**
	(0.148)	(0.211)
Tenure (<5 years = ref cat.)		
5 - 10 jaar	0.0826	-0.137
	(0.246)	(0.193)
10 - 15 jaar	-0.0234	-0.121
	(0.237)	(0.186)
15 - 20 jaar	-0.247	0.305
	(0.252)	(0.214)
20 - 25 jaar	0.0821	0.890**
	(0.320)	(0.280)
25 – 30 jaar	-0.773*	0.204
	(0.392)	(0.291)
30 – 35 jaar	-0.123	0.468
	(0.403)	(0.332)
> 35 jaar	-0.0227	-0.0149
	(0.814)	(0.497)
Statute (civil servant = ref cat.)		
civil servant on probation	0.961	-0.614
	(0.573)	(0.859)
contractual	0.215	0.399*
	(0.184)	(0.176)
contractual on probation		-0.0912
		(1.041)
Age	0.0457	-0.0298
	(0.0416)	(0.0325)
Managerial position	-0.422*	0.628
	(0.193)	(0.351)
Month (March = ref cat.)		
April	0.110	0.0888
	(0.159)	(0.146)
May	0.0455	-0.0882
	(0.186)	(0.170)
Constant	7.521**	9.527**
	(0.567)	(0.870)
Observations	568	618
R-squared	0.041	0.064

Standard errors in parentheses
** p<0.01, * p<0.05

Supplementary materials article 3

Additional information operationalizations

Proactivity

Indicate to what extent you do the following at work:

- I come up with ideas to improve the way my tasks are performed.
- I introduce better ways to perform my tasks.
- I come up with creative ideas.
- I raise issues even though I assume that a dispute may arise.
- I make suggestions about how recurring problems can be avoided.

Answer categories: 1 – Never; 2 - Rarely; 3 – Sometimes; 4 – Often; 5 – Always

Changes experienced

Please indicate to what extent you agree with the following statements:

- Change occurs frequently in my work context.
- I feel that we are always changing things.
- Taken together, the changes of the past three years have had a significant impact on my work.
- I feel that the same things in my immediate work environment are constantly being changed.

Answer categories: 1 – Strongly disagree; 2 - Disagree; 3 – Somewhat disagree; 4 - Neither agree nor disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree

Intrinsic motivation

Please indicate to what extent you agree with the statements below. By 'others' we mean managers, colleagues, family, customers, etc.

I put in effort at work....

- Because I enjoy my work.
- Because the work I do is stimulating.
- Because the work I do is interesting.
- Because I find it personally important to dedicate myself to my work.
- Because committing myself to this work is consistent with my personal values.
- *Answer categories: 1 – Strongly disagree; 2 - Disagree; 3 – Somewhat disagree; 4 - Neither agree nor disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree*

Table 3.3. Factor analysis proactivity, changes experienced, and intrinsic motivation

Survey item	Factor Loading
Proactivity	
I come up with ideas to improve the way my tasks are performed.	0.832
I introduce better ways to perform my tasks.	0.826
I come up with creative ideas.	0.711
I raise issues even though I assume that a dispute may arise.	0.596
I make suggestions about how recurring problems can be avoided.	0.724
Eigenvalue	2.759
Cronbach's Alpha (Scale reliability coefficient)	0.843
Changes experienced	
Change occurs frequently in my work context.	0.769
I feel that we are always changing things	0.861
Taken together, the changes of the past three years have had a significant impact on my work.	0.665
I feel that the same things in my immediate work environment are constantly being changed.	0.688
Eigenvalue	2.249
Cronbach's Alpha (Scale reliability coefficient)	0.835
Intrinsic motivation	
Because I enjoy my work. (Q52_1)	0.778
Because the work I do is stimulating. (Q52_2)	0.820
Because the work I do is interesting. (Q52_3)	0.794
Because I find it personally important to dedicate myself to my work. (Q52_4)	0.625
Because committing myself to this work is consistent with my personal values. (Q52_5)	0.559
Eigenvalue	2.612
Cronbach's Alpha (Scale reliability coefficient)	0.836

Supplementary materials article 4

Additional information operationalizations

In the past year (survey wave 1)/ past 3 months (waves 2 & 3), did you experience the following changes in your work environment? *yes/no*

- Physical change: A change to the physical environment of the workplace, such as a renovation, move, or redecoration.
- Structural change: A change to the organizational structure, such as a change in the reporting lines or the division of responsibilities.
- Change in management team: A change to the management team, such as the hiring of a new manager or the departure of an existing manager.
- Change in direct leader: A change to the direct supervisor, such as the hiring of a new supervisor or the departure of an existing supervisor.
- Change in function: A change to the job role, such as a change in the tasks and responsibilities of the job.
- Change in processes: A change to the way work is done, such as a new way of handling customer complaints or a new way of processing orders.
- Hiring: An increase in the number of employees.
- Downsizing: A decrease in the number of employees.

Additional information analyses

Cortisol Analysis

The analysis of the cortisol concentration from the hair samples of participants was performed at the laboratory of a University Hospital using an in-house developed liquid chromatography-tandem mass spectrometry assay (LC-MS/MS assay) based on the method described by Noppe et al. (2015). This method combines the liquid chromatography's capacity to separate compounds of interest from a complex matrix with the mass spectrometry's capacity to identify and quantify these compounds. For the sake of readability, we provide a lay explanation of the different steps comprising this method here. A more detailed and thorough explanation with technical specifications of the analysis, concentrations and suppliers of the used devices and solvents are added in appendix.

Each batch of samples was analyzed with a standard curve which was obtained by running the analysis with stock solutions of cortisol concentrations. These stock solutions comprised a range of 0-300 pg

cortisol. The concentration of cortisol in the hair samples can be derived based on the standard curve. An internal standard was added to each sample to correct for variations introduced during sample preparation.

The analysis of the hair samples comprised several pre-analytical steps including decontamination, homogenization, extraction and clean-up (Kintz et al., 2007). First, hair lengths of the individual samples were measured, and the 3 cm of hair proximal to the scalp were cut for further sample preparation to ensure all samples have the appropriate length. These 3 centimeters represent hair cortisol secretion of approximately the past three months. Second, hair samples were decontaminated to remove any exterior deposition on the hair samples. Samples were decontaminated by gently stirring the samples in methanol and acetone and benchtop drying them for 5 minutes. Third, the decontaminated hair samples were homogenized by grinding them in a mixer mill during 5 minutes at 30 Hz. This is critical as the hair strains are broken down in a powder consistency from which the analytes of interest can be easily extracted. The powdery samples were stored in aluminum foil until further analysis.

After these pre-analytical steps, the internal standard solution was added to the powdery samples along with methanol. The mixture of the sample with the internal standard and cortisol was incubated for 18 hours at 25°C, vortexed and centrifuged. The supernatant was transferred to a new glass tube, dried and resuspended with methanol.

To further isolate cortisol from other interfering compounds, we performed a Solid Phase Extraction (SPE). Based on polarity, the SPE separates the interfering compounds from the compounds of interest by loading the sample on conditioned reverse phased sorbent. Several solvents are used to elute interfering substances, finally, the compounds of interest are eluted in a 96 well plate using methanol.

The eluates are introduced into the LC-MS/MS system. Cortisol is separated from its matrix on the LC column (retention time). Figure 2 below depicts the output of the LC-MSMS with a peak at the retention time for cortisol. The mass spectrometer identifies and quantifies the cortisol signals. The mass spectrometry measures the concentration of the identified compounds in ratio with the internal standard. Here, the mass of the compounds of cortisol are first measured charging them with an electric spray (ionization). By closely observing the behavior of the ionized molecules, the mass spectrometer calculates the mass of the compound as a function of its molecular weight.

Figure 4.5. Chromatographic peak of cortisol in a quality control sample. The cortisol fragment (m/z 407.2 to 297.2) peak has a retention time of 1.99 min and is separated from any other analytes.