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Do visionary and servant leaders reduce cognitive uncertainty of professionals? A study of team-based settings in public organizations

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ABSTRACT

Team-based organizations meet societal demands by becoming flexible, innovative, and responsive. However, decreased reliance on rules in such organizations may negate an original purpose of bureaucracies: reducing employees' cognitive uncertainty. Drawing on social identity and social learning theories, this article examines how servant and visionary leadership reduce cognitive uncertainty in team-based organizations. Using multilevel SEM on data from 914 professionals in 101 Dutch public-sector teams, it shows that visionary leadership reduces cognitive uncertainty through team cohesion and servant leadership reduces cognitive uncertainty directly and through learning behaviour. The findings show how organizations can reduce cognitive uncertainty without reverting to rules.

KEYWORDS Cognitive uncertainty; visionary leadership; servant leadership; teamwork; learning behaviour

Introduction

Reducing cognitive uncertainty can be argued as a central trait of the bureaucratic organization (Gajduschek 2003; O'Toole and Meier 2003). Bureaucracies reduce cognitive uncertainty by standardizing work through comprehensive rules and procedures (Bernards et al. 2021; Gajduschek 2003; Raaphorst 2018; O'Toole and Meier 2003; Weber, 1972 [1922]). However, changing societal demands have spurred many public sector organizations to move away from the bureaucratic towards other organizational forms, such as team-based organizations, which are more flexible, innovative, and responsive (Groeneveld and Kuipers 2014). In a team-based structure, teams are given considerable autonomy in performing the work while team members are jointly accountable for the results (Groeneveld and Kuipers 2014; Cohen and Bailey 1997). Although these team-based organizational structures may succeed in achieving flexibility, innovation, and responsiveness, they may increase cognitive uncertainty among employees (Bernards et al. 2021; Gajduschek 2003). Cognitive uncertainty has been defined as experiencing incomplete, unclear or conflicting information in one's work (Bernards et al. 2021; Michel 2007; Raaphorst 2018). Research in the field of

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administrative behaviour has shown that cognitive uncertainty is an impediment to rational decision-making and thus reduces employee effectiveness and performance (March and Simon 1958; Simon 1976).

While cognitive uncertainty is reduced in traditional bureaucracies through formalization and centralization (Mintzberg 1980), team-based structures need other means to manage cognitive uncertainty. The introduction of comprehensive sets of rules would undermine the autonomy that is granted to teams of professionals in this type of organizations and, as such, also limit their ability to be flexible and responsive (Groeneveld and Kuipers 2014). Consequently, this study does not focus on reducing cognitive uncertainty through written rules and procedures, but on managing cognitive uncertainty through leadership behaviours. Leadership has been shown to be particularly effective in guiding employee efforts under conditions of uncertainty (Shamir and Howell 1999).

Therefore, this study examines how leadership, in particular visionary and servant leadership behaviours, relates to the cognitive uncertainty experienced by employees. These two types of leadership behaviour are addressed because they offer complementary perspectives on the management of cognitive uncertainty by operating on different levels with different foci. Visionary leadership focusses on the team level and is concerned with managing cognitive uncertainty by providing direction to teams and by giving employees a clear sense of purpose in their work (Stam et al. 2014). In contrast, servant leadership operates at the individual level and is about the dyadic relationship between leader and employee. It is expected to manage cognitive uncertainty by empowering employees to deal with the inevitable contingencies in their work (Eva et al. 2019). As such, this study compares two of the most studied and most effective leadership behaviours (Van Dierendonck et al. 2014) in their effect on cognitive uncertainty reduction.

Consequently, this study also examines two distinct theoretical mechanisms that could explain the relationships between visionary and servant leadership behaviours and cognitive uncertainty. First, the relationship between visionary leadership and cognitive uncertainty is examined through social identity theory (Turner 1975): positing that visionary leadership will reduce cognitive uncertainty among professionals through the formation of a collective group identity in which team members work together towards shared team goals. Second, the relationship between servant leadership and cognitive uncertainty is examined through social learning theory (Bandura 1977) that posits that servant leaders stimulate their employees to learn, thus contributing to less cognitive uncertainty. The central research question of this article is thus: *To what extent, and how, are visionary and servant leadership behaviours related to the cognitive uncertainty experiences of public professionals in team-based organizational settings?*

The empirical case in this study involves social welfare teams in the Netherlands. These teams have been introduced since 2015 in many Dutch municipalities and are a prime example of a team-based organization: they consist of public professionals from various professional backgrounds who have to work together to solve problems for clients and who are held jointly responsible for the results.

In answering the research question, this article makes two distinct theoretical contributions. First, it contributes to the literature on cognitive uncertainty (Bernards et al. 2021; Michel 2007; Raaphorst 2018) by studying the management of cognitive uncertainty by means of leadership rather than by reducing cognitive

uncertainty through rules and procedures. As such, this article extends the literature in which cognitive uncertainty reduction is assumed to be achieved through formalization (Raaphorst 2018). Viewing leadership as an antecedent of uncertainty reduction has important implications for practice since it would allow organizations to maintain their decentralized and deregulated organizational form while also managing employees' cognitive uncertainties. Furthermore, if leadership is a behavioural antecedent of cognitive uncertainty, this could complement formalization since the latter cannot be expected to reduce all forms of cognitive uncertainty. For instance, it may not be possible to reduce cognitive uncertainty resulting from weighing competing values and governmental goals by written rules.

Second, this article contributes to the literature on public leadership. While most research acknowledges the importance of leadership in shaping the work experience of employees, there is still much debate on which behaviours are effective in directing and supporting employees in the public sector (Klijn, de Boer, and Eshuis 2020; Vogel and Werkmeister 2021). Traditionally, transformational leadership has been the style most studied in public management research (Vogel and Masal 2015). However, this concept has been heavily criticized as being an umbrella term covering various leadership behaviours related to different outcomes through different causal mechanisms, rather than a coherent leadership theory (Van Knippenberg and Sitkin 2013). Consequently, some scholars have reconceptualized transformational leadership, in effect by limiting it to its visionary component (Jensen, Andersen, and Jacobsen 2019; Jensen et al. 2019). This reconceptualization has in turn been criticized for excluding the interactional element of the relationship between leader and follower (Keulemans and Groeneveld 2020). In an attempt to respond to these criticisms, the present study considers visionary and servant leadership behaviours, thereby accommodating both vision communication and the interpersonal relationship between leader and follower, and further examines two distinct causal mechanisms that might explain the relationship between leadership behaviour and reduced cognitive uncertainty among employees.

In answering the research question, this article proceeds as follows. In the theory section, the main dependent variable of the research, cognitive uncertainty, is described and hypotheses are formulated. This is followed in the methods section by a description of the population sample, research design and measures. In the subsequent analysis, multilevel structural equation modelling is used to test the hypotheses. The findings are based on a survey (n = 914) among Dutch social welfare professionals working in a team-based organizational structure. The article concludes by discussing the findings in light of the literature on public leadership and cognitive uncertainty.

Theory and hypotheses

Cognitive uncertainty

Based on earlier research on cognitive uncertainty (Bernards et al. 2021; Michel 2007; Raaphorst 2018), cognitive uncertainty is conceptualized here as experiences of incomplete, unclear or conflicting information in an employee's work.

While previous research has devoted considerable attention to the *sources* of uncertainty (incomplete, unclear and conflicting information), it has not fully addressed which aspects of the work may be subject to cognitive uncertainty (Bernards et al. 2021; Raaphorst 2018). This study therefore puts an emphasis on the

work-related *domains* that could be subject to experiences of cognitive uncertainty. In line with public management research on ambiguity – a line of research that emphasizes cognitive uncertainty caused by a need to interpret unclear information – a distinction is made between the goal, role, and task domains (Rainey and Jung 2010; Rainey 1983; Breaugh and Colihan 1994). This will help specify the types of cognitive uncertainty that can be affected by leadership.

Whereas goal uncertainty is concerned with the question of what the aims of the work are, role uncertainty focusses on the behaviours that are needed and appropriate *given* certain goals, and task uncertainty is concerned with how to go about performing a specific work task. In short, cognitive uncertainty can have different sources and can affect different work domains. Consequently, in this article, cognitive uncertainty is defined as experiencing incomplete, unclear or conflicting information *regarding an employee's goals, roles or tasks*. The remainder of the theory section specifies how leadership affects cognitive uncertainty in the different domains. However, anticipating that both visionary and servant leadership behaviours can affect uncertainty in all domains, separate hypotheses are not formulated for each domain.

Leadership and uncertainty

Previous research has already devoted ample attention to the effects of leadership under conditions of uncertainty. This applies both to the business/general management literature (e.g. Shamir and Howell 1999; Waldman et al. 2001) and to a lesser extent also in the public management literature (Van der Wal 2017). This stream of the literature argues that leadership is especially effective in guiding employee efforts when employees face uncertainty, since these situations are often unstructured and lack clear expectations regarding employee responses. This provides opportunity for leadership to guide and direct employees in their behaviour (Shamir and Howell 1999).

However, previous studies have not yet explicitly studied cognitive uncertainty experiences of employees as an outcome variable of leadership. Rather, studies on leadership effectiveness under conditions of uncertainty either assume high levels of uncertainty (e.g. Shamir and Howell 1999; Van der Wal 2017) or focus on correlates of cognitive uncertainty, such as goal and role ambiguity (Rainey and Jung 2015; Backhaus et al. 2021). Studies on correlates of cognitive uncertainty show that leadership can reduce goal and role ambiguity. On the one hand, this is done by clarifying goals and roles and prioritizing among competing goals, thus aiming to solve ambiguity (Rainey and Jung, 2014). On the other hand, leadership behaviour that focusses on sense-giving has shown to be effective in managing ambiguity for employees: leaders then do not aim to solve ambiguity for employees, but instead teach employees to accept it as inevitable and show them how to deal with ambiguity (Backhaus et al. 2021). However, this research has not paid attention to the task domain and, moreover, ambiguity can only be seen as one of the sources of cognitive uncertainty that has to do with the need to interpret unclear information (Bernards et al. 2021). Studies that focus on correlates of cognitive uncertainty do indicate that leadership mechanisms are quite promising in reducing cognitive uncertainty experiences of employees (Backhaus et al. 2021; Rainey and Jung 2014). Therefore, the present study examines visionary and servant leadership behaviours as antecedents of cognitive uncertainty reduction.

Visionary leadership and cognitive uncertainty

The ability to communicate a vision has long been seen as a key behaviour of outstanding leaders (Stam et al. 2014; Venus, Stam, and Van Knippenberg 2019). Visionary leadership is, furthermore, seen as an increasingly important concept in public management research since recent research has shifted attention away from the traditional, multi-faceted transformational leadership concept towards visionary leadership (Jensen, Andersen, and Jacobsen 2019; Jensen et al. 2019; Van der Voet and Steijn 2021). Visionary leadership may be defined as the dissemination of 'a (verbal) future image of a collective with the intention to persuade others to contribute to the realization of that future' (Van Knippenberg and Stam 2014, 3). Visions differ from most other goals in the sense that they are more abstract and more focused on the longer term (Kirkpatrick and Locke 1996). The successful communication of a vision by leaders is shown to provide followers with a sense of identity and purpose (Venus, Stam, and Van Knippenberg 2019). This may be especially relevant in a public sector context since working towards the vision of a public sector organization should closely align with the prosocial or altruistic motivation of public professionals and, therefore, visionary leadership may be especially effective in achieving desirable employee outcomes (Andersen et al. 2018a, 2018b). By providing followers with a sense of direction and purpose, visionary leaders are expected to contribute to reducing employees' cognitive uncertainty in two ways.

First, visionary leaders not only 'develop, share, and sustain' a vision for the organization, they also translate this vision into concrete goals (Bronkhorst, Steijn, and Vermeeren 2015) and into 'tangible contributions that can be made by followers' (Whittington, Goodwin, and Murray 2004). As such, visionary leaders are expected to reduce cognitive uncertainty in the goal domain by ensuring that all employees know the team's goals. Furthermore, by translating these goals into tangible employee-contributions, visionary leaders concretize and explain to employees how they can contribute to achieving the organization's goals. Therefore, visionary leadership behaviours are expected to also lower cognitive uncertainty in the role and task domains.

Second, visionary leaders may be able to mitigate the cognitive uncertainty resulting from ambiguous and conflicting goals. Especially in the public sector, organizational goals are often ambiguous or conflicting because of competing values and the inherently political environment that characterize public organizations (Hood 1991; Davis and Stazyk 2014). Here, visionary leaders can provide clarity by explaining the goals and by prioritizing certain goals over others in line with the vision of the team (Berson and Avolio 2004; Densten 2005). In addition, visionary leaders stimulate employees to internalize the purpose of the organization (Stam et al. 2014), making it easier for employees to weigh conflicting goals and interpret ambiguous goals in the light of the organizational vision, and encourage employees to discuss how this affects their role in the team to help them reframe their roles in a consistent manner (Paarlberg and Lavigna 2010). These two arguments lead to the first hypothesis:

Hypothesis 1: *Visionary leadership is negatively related to public professionals' cognitive uncertainty.*

Team cohesion as a mediator

To better understand how visionary leadership influences cognitive uncertainty, it is important to look at team processes (Zaccaro, Rittman, and Marks 2001). Part of the relationship between visionary leadership and cognitive uncertainty may be explained by the effect that visionary leaders have on their team. More specifically, visionary leadership is expected to contribute to team cohesion, which in turn contributes to reduced cognitive uncertainty. This mechanism can be explained using social identity theory (Turner 1975). Social identity theory emphasizes processes towards forming a collective group identity. An important determinant of collective group identity formation is the extent to which team members work towards shared team goals (Turner 1975). Visionary leaders will stimulate this process by disseminating clear team goals, attaching shared meaning to these goals, and by explaining to team members how they need to work together in order to achieve the team's goals (Bass et al. 2003). This process may play an even stronger role in the context of multidisciplinary teams (Van Zijl et al. 2019) where shared goals can bring team members with different professional backgrounds together and unite them in their efforts to achieve these goals.

Strong team cohesion is expected to reduce individuals' cognitive uncertainty. First, team cohesion is expected to reduce cognitive uncertainty in the goal and role domains. In strongly cohesive teams, team members spend more time together and communicate more to each other (Leo et al. 2019). This communication is crucial in forming a shared understanding of the team's goals. Especially in professional organizations, establishing clear and shared team goals is not the exclusive domain of managers: professionals can also play a role in shaping a team's goals (Lee, Rainey, and Chun 2010). By critically assessing and discussing the team's goals with each other, team members can reduce the burden of cognitive uncertainty caused by ambiguous or conflicting goals. This argument also applies to role uncertainty: members of cohesive teams are expected to more extensively discuss their roles in achieving the team's goals, and will therefore be better able to shape their role in the team and thus experience less role uncertainty (Bosselut et al. 2012; Eys and Carron 2001).

Second, the way in which visionary leadership contributes to reducing cognitive uncertainty in the goal and role domains by enhancing team cohesion is also expected to trickle down to the task domain. Building on the premise that team members in highly cohesive teams communicate more with each other and together shape the team's goals, and their individual roles in achieving these goals, team members would also acquire a good understanding of the professional knowledge and expertise of other team members (Leo et al. 2019; Van Knippenberg, De Dreu, and Homan 2004). They will also share more task-related information within the group than in less cohesive teams (Turner et al. 1992). As such, they will better know who to consult on specific questions and can thus be expected to experience less cognitive uncertainty when this relates to having insufficient information about a certain situation. This effect may be especially strong in multidisciplinary teams where the knowledge of professionals with other backgrounds is often needed to perform a task well (Van Zijl et al. 2019). Furthermore, highly cohesive teams are characterized by higher levels of trust among team members (Carless and De Paola 2000). This will make it easier not only to ask other team members for help in the form of information but also to share the burden of uncertainty caused by ambiguous or conflicting information with other team members.

In short, visionary leaders are expected to contribute to team cohesion by attaching shared meaning to the team´s goals. In turn, team cohesion is expected to be associated with lower levels of cognitive uncertainty because cohesive team members will together shape the team's goals and their roles in achieving these goals, as well as discussing task-relevant information with each other. This leads to the second hypothesis.

Hypothesis 2: *The negative relationship between visionary leadership and cognitive uncertainty is mediated by team cohesion.*

Servant leadership and cognitive uncertainty

The second leadership behaviour examined in this article is servant leadership. Where visionary leadership targets the team, servant leadership is concerned with the interpersonal relationship between the leader and individual followers (Eva et al. 2019; Greenleaf 2002; Van Dierendonck et al. 2014). It is important to complement the team focus of visionary leadership with individual-oriented leadership behaviours because many aspects of a professional's work are carried out individually, such as documenting cases and house visits. Furthermore, servant leadership behaviour should be highly relevant in the present study given the public sector context addressed. Since the core value of servant leadership is serving others, it should align well with the leadership needs of public professionals who have an intrinsic motivation to serve the public interest and to help others (Klijn, de Boer, and Eshuis 2020; Miao et al. 2014).

Servant leadership is follower-centred leadership behaviour in which servant leaders put the wellbeing and interests of followers first. This expresses itself in empowering behaviours, such as sharing knowledge to help followers develop (Tuan 2016), stimulating followers to use their talents and learn new skills, and stimulating followers to make their own decisions rather than telling them what to do (Van Dierendonck and Nuijten 2011). Servant leaders are then not expected to remove every aspect of cognitive uncertainty that might arise in a given situation but, rather, to enable professionals to effectively deal with the inevitable contingencies in their work (Van Dierendonck and Nuijten 2011). They do so by focusing on the interpersonal relationship with followers and providing individual professionals with the skills, tools, and feedback necessary to perform their job well and to be able to deal with the cognitive uncertainty they experience in their work (Trastek, Hamilton, and Niles 2014).

These leadership behaviours could be especially effective with public professionals working in the social domain because of the complexity and unpredictability of working with clients (Raaphorst 2018). Leadership in these knowledge-based and complex work settings should be supportive rather than directive, as each situation a professional faces in their work is slightly different and directive steering would then be both time-consuming and ineffective (Chuang, Jackson, and Jiang 2016; Empson and Langley 2015). Servant leadership fits the supportive leadership characteristic needed in this context and servant leaders are expected to manage the cognitive uncertainty of followers by sharing knowledge and empowering employees to deal with uncertain situations. This leads to the third hypothesis:

Hypothesis 3: *Servant leadership is negatively related to public professionals' cognitive uncertainty.*

Learning behaviour as a mediator

Furthermore, servant leadership is expected to indirectly manage cognitive uncertainty by enabling employees to learn in their job. Learning can be defined as 'the acquisition and application of knowledge and skills to build capability and confidence' (Porath et al. 2012). Learning is expected to be negatively related to experiencing cognitive uncertainty for two reasons. First, when cognitive uncertainty is rooted in a lack of knowledge, it can be viewed as transient, and it can thus be solved by employees learning in the organization and thus acquiring more knowledge (Michel 2007). Second, learning enables employees to build the capability and confidence to deal with the contingencies that inevitably arise in their work. This is particularly relevant in more organic, rather than bureaucratic, organizational structures, where uncertain work conditions are seen as persisting and impossible to remove entirely (Michel 2007). The core of managing *experienced* cognitive uncertainty lies in teaching employees how to deal effectively with these situations.

Social learning theory posits that learning takes place in a social environment (Bandura 1977). Leaders play an important role in shaping the work environment of employees and, by stimulating proactive behaviour among followers and supporting them in their self-development, servant leaders are able to create a safe and stimulating learning environment (Van Dierendonck and Nuijten 2011). Furthermore, social learning theory emphasizes that much learning takes place vicariously (Bandura 1977). That is, learning does not only take place through direct interactions between servant leaders and followers but also by observing the outcomes of certain behaviours by other team members. So, for instance, when employees see that other team members are stimulated towards proactive behaviour and self-development by the servant leader, they will similarly feel stimulated to showing this behaviour themselves.

Furthermore, social learning theory posits that individuals learn by 'paying attention to and emulating the attitudes, values and behaviours of attractive and credible models' (Brown and Treviño 2006, 597). For instance, one could expect followers to emulate the empowering and knowledge-sharing behaviours of servant leaders. Servant leaders will thus foster a knowledge-sharing work climate (Song, Park, and Kang 2015) and, as such, create an environment in which learning is stimulated. So, servant leaders are expected to stimulate learning among followers by encouraging self-development and fostering role-modelling behaviour. This learning is expected to be associated with lower levels of cognitive uncertainty by building capability and confidence in dealing with difficult situations. This leads to the fourth hypothesis:

Hypothesis 4: *The negative relationship between servant leadership and cognitive uncertainty is mediated by individual learning behaviour.*

The theoretical expectations are summarized in (Figure 1).

Methodology

Case selection

The research context is that of municipal social welfare teams in the Netherlands. These teams have been being introduced in the Netherlands since 2015 in response to new legislation that decentralizes many health and welfare responsibilities to

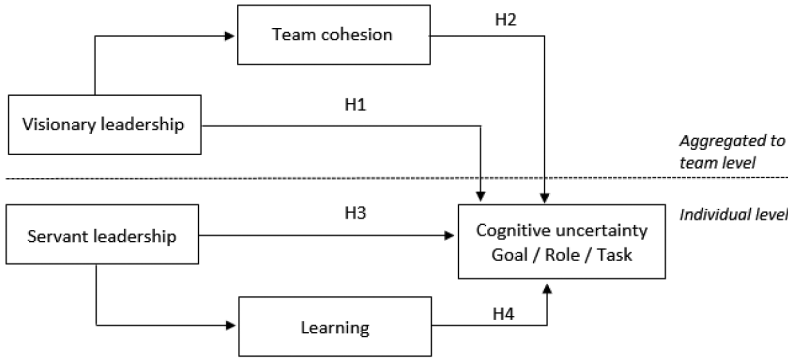

Figure 1. Theoretical model.

municipalities. In these social welfare teams, professionals from various disciplinary backgrounds, such as welfare, employment, addiction, youth care and financial support, work together to achieve shared goals for clients (Van der Voet and Steijn 2021). By integrating a range of disciplinary insights, emphasizing interprofessional collaboration, and focusing on professional autonomy, the teams are intended to achieve a higher quality service for clients and also to reduce bureaucracy (Van Zijl et al. 2019).

These teams provide a good environment in which to study leadership in a team setting because the team members are interdependent in their tasks and they share responsibility for outcomes (Cohen and Bailey 1997). Furthermore, this is a rich case in terms of potential cognitive uncertainty in different domains. For instance, in the goal domain cognitive uncertainty can arise due to the need to interpret vague goals, such as the need to 'properly compensate clients for any disabilities', in the light of everyday situations. In the role domain, conflicting role demands can give rise to cognitive uncertainty. This can for instance be seen when team members' roles require them to both unburden other professionals, such as general practitioners and psychologists, and to push these same professionals to take action for clients when that is needed. In the task domain, the need to base decisions on limited information of often unwilling clients is an example of a work condition that can be at the root of cognitive uncertainty (see also: Lipsky 1980; Raaphorst 2018). This case therefore offers a good opportunity to study cognitive uncertainty in team-based organizational forms. The research studied social welfare teams operating in three large Dutch municipalities (Amsterdam, Rotterdam and The Hague). As such, the research design maximizes the number of teams participating in the study while minimizing the variation in contextual differences (Van der Voet and Steijn 2021).

Data collection

The data for this study were collected using a large-scale online survey among public welfare professionals in the Netherlands between June 2017 and March 2018. In total, 111 teams involving 2040 employees were approached. The response rate was 50% (1018 responses). Of these responses, 43 were incomplete and lacked values for some of the variables of interest. These responses were excluded from the analysis, resulting in an effective response sample of 975 respondents. The team sizes ranged between 6 and

45 (M= 17.36; SD = 8.07). In terms of demographics, 86.1% of respondents were female and 13.9% were male. This reflects the overall gender ratio in the public welfare domain in the Netherlands. The age of the respondents ranged between 21 and 70 years old (M = 41.95, SD = 11.95).

Measures

Cognitive uncertainty

The dependent variable, cognitive uncertainty, was measured as a multidimensional concept, differentiating between goal, role, and task uncertainties. Lacking an existing scale for cognitive uncertainty, new scales were developed, with three, four, and three items respectively for goal, role, and task uncertainty, and validated through two focus groups of professionals (total n = 15). The items drew on existing scales for goal, role, and work method ambiguity (Rainey and Jung 2010; Rainey 1983; Breaugh and Colihan 1994). Sample items included the following: 'I know the goals of my team' (goal), 'In my role in the team, I know exactly what is expected of me' (role), and 'When I work on a case, I know what the best approach is to do my work' (task). All three scales were reliable, with Cronbach's alpha values of .857, .892, and .866 for goal, role, and task uncertainty respectively.

Independent variables

Visionary leadership was measured using the five-item scale of Jensen et al. (2019). An example item being: 'My manager communicates a clear vision of the organization's future'. The reliability of this scale was good (α = .916). For servant leadership, five items from the scale of Van Dierendonck and Nuijten (2011) were used with an example item being: 'My manager helps me to further develop myself'. The resulting scale was again very reliable (α = .926). Employees' perceptions of leadership characteristics were measured since previous research has shown that there are substantial differences between employee-perceived and leader-intended leadership and that only the former is related to performance (Jacobsen and Andersen 2015). In addition, scores for visionary leadership were aggregated to the team level since this concept refers to a process that is aimed at providing multiple employees with a shared understanding of the organization's goals (Jensen et al. 2019). As such, the effects of visionary leadership are contingent on whether visionary leadership is actually perceived at the team level. Servant leadership, in contrast, is about the dyadic relationship between team leader and employee (Greenleaf 2002). This means that servant leadership behaviours are contingent on the personal needs of employees. Therefore, the scores for servant leadership are not aggregated to the team level.

Mediating variables

Team cohesion was measured using a five-item scale based on Carless and De Paola (2000). An example item is: 'In this team, we work as one in achieving our goals' and the team cohesion scale was reliable (α = .898). Team cohesion was aggregated to the team level. Finally, individual learning behaviour was measured using four items from Porath et al. (2012) including: 'At work, I continue to learn more and more as time goes by'. One, reversed, item was dropped since it had a low factor loading in an exploratory factor analysis and substantially reduced the reliability of the scale. The

resulting three-item scale was then reliable (α = .822). All the above items measuring dependent, independent, and mediating variables were measured using a five-point Likert scale ranging from '1' *strongly disagree* to '5' *strongly agree*.

Controls

The age of the respondents, their gender, and the size of the team in which they work served as control variables. An overview of all the items can be found in Appendix.

Analysis

The analytical strategy was to study cognitive uncertainty, servant leadership and learning on the individual level, and perceptions of visionary leadership and team cohesion as they are shared within a team. This is done because visionary leadership and team cohesion are considered team-level constructs, which means that the individual responses by members of the same team on the items of these constructs are viewed as repeated measures of the same construct. Therefore, aggregated variables for the visionary leadership and team cohesion constructs were created by averaging the individual scores for each of these constructs to provide team means (Van Mierlo, Vermunt, and Rutte 2009). Aggregating these variables to the team level provides a better depiction of these team concepts and minimizes possible individual response bias (Favero and Bullock 2014). Nevertheless, in order to determine whether aggregation was appropriate and meaningful, the intraclass correlation coefficients (ICC) of visionary leadership and team cohesion were calculated.[1] The resulting values for ICC1 were .08 and .12 for visionary leadership and team cohesion respectively, and ICC2 values were .60 and .70 respectively. ICC1 indicates the proportion of variance that can be explained by team membership and ICC2 the reliability of the team mean scores. For both variables, the ICC values justify aggregation to the team level, with ICC1 values falling within the typical range of .05 to .20 (Bliese 2000) and the ICC2 scores indicating reliability with values of .60 or above (Cicchetti 1994).

The analytical strategy impacts on which data can be used in the analysis. In order to confidently estimate team averages for leadership perceptions and team cohesion, only teams where at least 30% of their members responded should be included. On this basis, 9 teams with a total of 51 respondents were excluded. The analyses were thus performed on a dataset that consists of responses from 914 professionals working in 101 teams.

The analysis relies on multilevel structural equation modelling (SEM) using the statistical program*R* with the *lavaan* package (Rosseel 2012). SEM is appropriate because it allows examination of relationships between multiple independent, mediating, and dependent variables in a single model. This makes relationship estimates of complex models using SEM more realistic than using conventional statistical techniques, such as regression analysis (Kline 2016). Multilevel SEM is used since the data has a hierarchical structure with persons nested in teams. Because this leads to interdependent observations, a multilevel approach is the most appropriate way of analysis (Hox, Moerbeek, Van de Schoot 2017).

Before discussing the results of the analysis, it is important to first assess the fit of the measurement model. Traditionally, a non-significant chi-square test result is seen as an indicator of a good fit with the data. However, this indicator is highly sensitive to sample size, and relative fit indices have been recommended as more appropriate

Table 1. Fits of the measurement and structural models.

Model	Chi-square	DF	p	CFI	RMSEA	SRMR
Measurement models						
1 factor model	15,310.040	350	.000	.322	.216	.220
3 factor model	8845.560	347	.000	.615	.164	.151
7 factor model	1838.130	329	.000	.932	.071	.034
7 factor multi-level model	737.653	159	.000	.953	.063	.038
Path model						
Multilevel mediation model including controls	20.749	32	.000	.986	.080	.026

DF: Degrees of Freedom; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Residual.

(West, Taylor, and Wu 2012). Consequently, this article uses the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR) to evaluate fit. Generally, values of CFI >.95, RMSEA <.05 and SRMR <.06 are considered indicators of a good fit and CFIs >.90 and RMSEAs <.10 are still seen as an acceptable fit of the model to the data (Hu and Bentler 1999).

(Table 1) provides the overall fit statistics of the model. Initially, the fit statistics of the measurement models are examined to compare the multilevel seven-factor model with a regular seven-factor model, a three-factor model (which grouped all independent, mediating, and dependent variables into single factors) and a one-factor model. The results show that the multilevel seven-factor model has a satisfactory fit and one that is also substantially better than previous models. In order to estimate the multilevel mediation model including controls, variables containing composite scores of the measurement scales were constructed in advance. This is done because the multilevel mediation model with latent variables is too complex to be reliably estimated, due to the multilevel structure and the number of parameters that need to be estimated in relation to the size of the dataset (Kline 2016). The results show that the final multilevel mediation model including controls adequately fits the data and can be used to test the study's hypotheses.

Results

(Table 2) provides descriptive statistics, correlations between the variables and the Average Variances Extracted (AVEs) of each construct. It is initially noteworthy that a fairly strong positive correlation exists between the two leadership behaviours (.398, p = .000). This indicates that visionary and servant leadership in practice often go hand in hand: leaders that show much visionary leadership behaviours also tend to show much servant leadership behaviours. Furthermore, as might be expected, relatively strong, positive correlations exist among goal, role and task uncertainties: .555 (p = .000) between goal and role uncertainty; .380 (p = .000) between goal and task uncertainty; .668 (p = .000) between role and task uncertainty. In the SEM model, these correlations are taken into account by including the covariances between the two leadership behaviours and between the three types of cognitive uncertainty. In addition, the discriminant validity of the constructs was assessed by calculating the AVEs of each construct. The results indicate that all the constructs have discriminant validity since all the AVEs are above the threshold of .50 and the AVE of each latent construct is also greater than that construct's highest squared correlation with any other latent

Table 2. Descriptive statistics, correlations, and average variances extracted (n = 914 professionals and n = 101 teams).

		M	SD	1	2	3	4	5	6	7	8	9	10
1	Visionary leadership	3.59	0.41	**.752**									
2	Team cohesion	3.93	0.40	0.524**	**.715**								
3	Servant leadership	3.84	0.38	0.398**	0.230**	**.773**							
4	Learning	3.93	0.73	0.130**	0.130**	0.396**	**.747**						
5	Goal uncertainty	2.30	0.77	−0.191**	−0.220**	−0.317**	−0.302**	**.787**					
6	Role uncertainty	2.01	0.68	−0.113**	−0.173**	−0.235**	−0.240**	0.555**	**.760**				
7	Task uncertainty	2.00	0.61	−0.012	−0.084*	−0.156**	−0.138**	0.380**	0.668**	**.789**			
8	Gender (0 = male)	0.86	n/a	0.011	0.041	−0.002	−0.023	0.063	0.060	−0.003	n/a		
9	Age	41.97	11.96	−0.034	−0.020	−0.047	−0.146**	−0.012	−0.095**	−0.068*	0.092**	n/a	
10	Team size	17.36	8.07	0.018	−0.120**	−0.032	−0.032	0.040	0.016	0.021	0.096**	0.001	n/a

*p < 0.05; **p < 0.01.
The emboldened diagonal elements represent the AVEs of the respective constructs.

construct (Fornell and Larcker 1981). This means respondents are capable of distinguishing related concepts from each other, such as the three types of cognitive uncertainty and the two leadership behaviours.

(Table 3) contains the results of the multilevel SEM analysis and these can be used to judge the hypotheses. Hypotheses 1 and 2 concern the relationship between visionary leadership and cognitive uncertainty. Hypothesis 1 stated that there is a direct, negative relationship between visionary leadership and cognitive uncertainty. This hypothesis has to be rejected since no significant, negative relationship between visionary leadership and either goal, role or task uncertainty was found. The identified *positive* direct relationship between visionary leadership and task uncertainty is most likely due to the mediator acting as a suppressor variable (MacKinnon, Fairchild, and Fritz 2007). Hypothesis 2 posited that there is a negative, indirect relationship between visionary leadership and cognitive uncertainty through team cohesion. This hypothesis is supported by the data. First, a significant, positive relationship was found between visionary leadership and team cohesion (.483, $p = .000$) and, second, a significant, negative indirect relationship between visionary leadership and cognitive uncertainty through team cohesion is found (−.141, $p = .003$ for goal uncertainty, −.119, $p = .001$ for role uncertainty, and −.070, $p = .022$ for task uncertainty). This indicates that visionary leadership reduces cognitive uncertainty in the domain of goals through enhancing team cohesion.

Hypotheses 3 and 4 concern the relationship between servant leadership and cognitive uncertainty. Hypothesis 3 states that there is a direct, negative relationship between servant leadership and cognitive uncertainty. This hypothesis is supported by the data with significant direct relationships between servant leadership and cognitive uncertainty in the goals, roles and tasks domains (−.199, $p = .000$ for goal uncertainty, −.131, $p = .000$ for role uncertainty, and −.106, $p = .000$ for task uncertainty). Hypothesis 4 posits that there is a negative, indirect relationship between servant leadership and cognitive uncertainty through individual learning behaviour. This hypothesis is also supported by the data. First, there is a significant, positive relationship between servant leadership and learning ($z = .350$, $p = .000$) and, second, a significant, negative indirect relationship between servant leadership and cognitive uncertainty through learning behaviour (−.076, $p = .000$ for goal uncertainty, −.060, $p = .000$ for role uncertainty, and −.028, $p = .009$ for task uncertainty). This indicates that servant leadership reduces cognitive uncertainty through learning behaviour.

Team size had been included as a control variable since team sizes varied quite substantially, between 6 and 45, in the dataset and it was felt that team size might impact on the effectiveness of leadership behaviour. However, the results show no significant relationship between team size and cognitive uncertainty, indicating that a larger team size does not make either of the studied leadership behaviours more or less effective.

Conclusions and discussion

This study has shown that cognitive uncertainty of employees can be managed using visionary and servant leadership. As emphasized below, these findings have important implications for both research and practice.

Table 3. Results of structural equation modelling.

	Goal uncertainty			Role uncertainty			Task uncertainty		
	coefficient	std. error	p-value	coefficient	std. error	p-value	coefficient	std. error	p-value
Direct effects									
Level 1									
Servant leadership	−.199	.033	.000	−.131	.030	.000	−.106	.028	.000
Learning	−.216	.035	.000	−.171	.032	.000	−.080	.030	.007
Age	−.003	.002	.083	−.007	.002	.000	−.005	.002	.007
Gender	.149	.067	.030	.105	.064	.092	−.018	.057	.755
Level 2									
Visionary leadership	−.005	.084	.954	.076	.065	.246	.156	.060	.014
Team cohesion	−.292	.085	.001	−.247	.064	.000	−.146	.059	.010
Team size	.001	.003	.829	−.001	.002	.612	.000	.002	.946
Indirect effects									
Level 1									
Servant leadership through learning	−.076	.014	.000	−.060	.012	.000	−.028	.011	.009
Level 2									
Visionary leadership through team cohesion	−.141	.047	.003	−.119	.036	.001	−.070	.031	.022

First, this study makes a theoretical contribution to the literature on public leadership, which extensively discusses which leadership behaviours are most effective in directing and supporting employees. Where some argue that visionary leadership is particularly effective in a public context because of the alignment between visionary leadership and the pro-social motivation of public professionals (Andersson and Liff 2012), others argue that vision communication is less relevant in a public sector context because public leaders are expected to focus more on rules, and maintaining stability, than on developing and sharing a vision for the future of the organization (Vogel and Werkmeister 2021). This study adds to this debate by showing the importance of vision communication for managing cognitive uncertainty in a professionalized public sector context.

Further, although servant leadership is infrequently studied in public management research, it arguably fits well with the public sector context because its core feature, of the leader serving others, aligns well with the leadership needs of public sector employees who have an intrinsic motivation to serve the public interest (Klijn, de Boer, and Eshuis 2020; Miao et al. 2014). Where Klijn, de Boer, and Eshuis (2020) failed to find an impact of servant leadership on the behaviour of public sector employees, this study found that servant leadership plays an important role in managing the cognitive uncertainty of employees. Given this finding, and the alignment of servant leadership with public sector values, further research into servant leadership in the public sector could usefully uncover how this leadership behaviour can, for instance, affect the performance of public sector employees.

Furthermore, this study contributes to the leadership literature by considering two theoretical mechanisms that could explain the relationship between leadership behaviours and employee outcomes. This study shows that social learning theory can explain the relationship between servant leadership and cognitive uncertainty, which enriches our understanding of how servant leadership can contribute to desirable follower outcomes. In addition, it shows that social identity theory can explain the relationship between visionary leadership and cognitive uncertainty. This indicates that the affective process of forming a collective team identity can have cognitive consequences by reducing professionals' experienced cognitive uncertainty. By reporting on two mediating mechanisms, this article offers a crucial contribution to the study of leadership since a focus on the theoretical mechanisms underlying the effects of leadership is largely absent in previous studies of leadership behaviour (Eva et al. 2019; Van Knippenberg and Stam 2014).

Second, the finding that both visionary leadership and servant leadership reduce professionals' cognitive uncertainty is an important addition to the existing literature on leadership and uncertainty. Where previous studies have already shown that visionary (Van Dierendonck et al. 2014; Waldman et al. 2001) and servant (De Sousa and Van Dierendonck 2014) leadership behaviours are effective in providing employees with guidance and support under conditions of uncertainty, this study has shown that these behaviours reduce cognitive uncertainty experiences of employees. This adds to the literature on cognitive uncertainty as well, since this literature generally assumes cognitive uncertainty reduction to take place through high levels of formalization in the organization (Bernards et al. 2021; Raaphorst 2018).

This has important implications for practice, as these findings provide organizations with tools on how to reduce employees' cognitive uncertainty in team-based organizations. Most notably, it shows the importance of leadership development in

organizations, especially for frontline managers. Organizations can, for instance, develop or reinforce servant leadership among team leaders by facilitating relationship building between leaders and employees (Bentein et al. 2021). Visionary leadership can be progressed by developing a clear and compelling vision for the organization's future and by stimulating team leaders to actively share the vision with the employees and sustain the employees' attention to the vision (Andersen et al. 2018b). Leadership development forms a compelling alternative for organizations as it allows them to manage cognitive uncertainty without reverting to rules that may come at the cost of the organization's responsiveness and flexibility.

Third, it is particularly noteworthy that the relationships between both leadership behaviours studied and goal and role uncertainties are much stronger than between leadership behaviours and task uncertainty (for visionary leadership, −.206 and −.153 for goal and role uncertainty, and −.086 for task uncertainty; for servant leadership, −.080 and −.075 for goal and role uncertainty, and −.033 for task uncertainty). A potentially useful avenue for future research would be to study whether task-oriented and directive leadership behaviours would be better able to decrease employees' experienced task uncertainty, by simply telling employees what they need to do and how they need to do it. Although task-oriented leadership behaviours have often been neglected in studies on public leadership, recent research has shown that followers see task-orientation as an important competence of public leaders (Vogel and Werkmeister 2021).

Another valuable avenue would be to investigate whether cognitive uncertainty reduction is always desirable. It is conceivable that task uncertainty in particular is positively associated with greater work autonomy, which would enhance self-determination and make the work more meaningful and motivating, and lead to higher levels of innovation (Griffin and Grote 2020). In a similar vein, research in the field of change management has shown that leaders can also strategically use uncertainty to make people feel slightly uncomfortable so as to create change (Heifetz, Grashow, and Linsky 2009). As such optimally managing cognitive uncertainty may not necessarily focus on achieving the lowest possible levels of cognitive uncertainty but rather on matching uncertainty levels with the desired level of employee cognitive uncertainty, and on strategically assessing the required amount of cognitive uncertainty given the organizational circumstances.

This study has a number of limitations that should not be ignored. The first limitation is that the results are based on cross-sectional data and that it is thus not possible to draw causal conclusions on whether certain leadership qualities do reduce cognitive uncertainty. The present research design is then unable to rule out that factors other than leadership influence the empirical results, such as organizational rules and procedures. However, such problems are most likely limited, since the research design is aimed at minimizing contextual differences and the professionals all operate within the same legal framework. Nevertheless, research that follows employees over an extended period would enable conclusions on cognitive uncertainty reduction through leadership to be drawn. As an alternative, the effects of an intervention, for instance a leadership training programme, could be studied to identify causal effects (Jensen, Andersen, and Jacobsen 2019).

Second, the present study uses a quantitative approach to deductively test two mechanisms through which leadership affects cognitive uncertainty experiences of professionals. As such, this study opens up the black box of how leadership contributes

to follower outcomes. However, future research using a qualitative approach (focus groups, interviews) is recommended in order to gain a broader and more nuanced understanding of the mechanisms that underpin the relationship between leadership and cognitive uncertainty (Klenke 2015). This research could both focus on exploring additional causal mechanisms and on gaining a more in-depth understanding of how exactly social identity and social learning theories can explain the relationship between certain leadership behaviours and cognitive uncertainty reduction.

Third, several measures were taken to avoid common source bias, such as aggregating individual-level data on visionary leadership and team cohesion to the team level, and presenting different constructs on different pages of the questionnaire (Favero and Bullock 2014; George and Pandey 2017). Nevertheless, some issues concerning endogeneity remain. Despite this, a survey among employees seems the most appropriate way to study this issue since both the mediating and the dependent variables are inherently perceptual. In addition, leadership has been measured from the viewpoint of employees, rather than using the leader's own rating, to avoid self-rating bias (Jacobsen and Andersen 2015).

Fourth, the context needs to be considered. The present case of social welfare teams in the Netherlands is a typical example of a team-based organizational structure aimed at reducing bureaucracy and providing professionals with autonomy. As such, it reflects a global trend in public sector organizations of adopting team-based organizations which are increasingly common in healthcare and welfare organizations (Van Zijl et al. 2019) and can also be found in local and national government agencies, water boards and schools (Groeneveld and Kuipers 2014; Van der Hoek, Groeneveld, and Kuipers 2018). At the same time, the professionalized context studied, with highly-trained professionals who have a substantial degree of job autonomy, may make this less suitable for studying how the behaviours of formally assigned leaders impact the cognitive uncertainty of professionals since the professionals concerned tend to operate autonomously and base their actions on training and experience. This could explain why many of the effects of leadership found in this study are indirect: leaders do not adopt a directive role but instead facilitate team cohesion and professional learning, behaviours that are already used by professionals to manage cognitive uncertainty. Future research could investigate whether leadership has a more direct effect in less professionalized contexts.

To conclude, where, traditionally, formalization and centralization have been seen as the main mechanisms for reducing cognitive uncertainty among employees, this study shows that leadership may offer an alternative route for reducing cognitive uncertainty, and one more in tune with ongoing work changes in the public sector. This study has shown there is a relationship between visionary leadership and less cognitive uncertainty in all three goal, role and task domains through its effect on team cohesion. It has also revealed a relationship between servant leadership and all three domains of cognitive uncertainty both directly and through employees' learning behaviour. As such, this study contributes to theory building in the field of leadership in public organizations. The findings also have implications for practice by showing that organizations can adopt a more organic, team-based structure whilst still managing employees' cognitive uncertainty.

Note

1. *Note: ICC values are calculated as follows: ICC1 = (MSB-MSW)/(MSB + (k-1) x MSW)) ICC2 = (MSB-MSW)/MSB. MSB = mean square between teams; MSW = mean square within teams; k = average team size.*

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Ethics declaration

I confirm that all the research meets ethical guidelines and adheres to the legal requirements of the study country. At the time of initiating this research, there was no ethical committee at the Faculty of Governance and Global Affairs of Leiden University and the requirement to obtain approval from such committee. All the subjects have provided appropriate informed consent.

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