Managing Employee Innovative Behavior Through Transformational and Transactional Leadership Styles

Evidence from a Large Danish Municipality

Abstract (97 words)
This paper focuses on the associations between leadership styles and employee innovative behavior. We studied the implementation of an ambitious innovation strategy in a large Danish municipality and examined how transformational and transactional leadership styles relate to innovative behavior. We combined data from two sources rating leadership styles of immediate supervisors and employee innovative behavior. The findings suggest that transformational leadership and one component of transactional leadership, namely verbal rewards, are positively associated with innovative behavior. The interaction between the two shows that innovative behavior is most likely when the leader combines transformational leadership with verbal rewards.

Key words
Transformational leadership, Transactional leadership, Innovative behavior.

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Introduction

Challenges in modern welfare states caused by economic crises and demographic fluctuations call for changes in the public sector, and innovation is often seen as a solution to existing problems. Innovation refers to ‘an idea, practice or object that is perceived as new by an individual or other unit of adoption’ (Rogers, 2003). Innovation is not necessarily a desirable end in itself since the value and usability of new ideas vary (Dudau, Kominis and Szocs, 2017). Innovation in the public sector bears little resemblance to private sector innovation, where it is seen as a necessary condition for profit maximization (Crosby et. al., 2017). However, researchers and practitioners agree that the presence of ‘unruly and wicked’ problems obligate public organizations to focus on how they enhance their innovativeness (Moore and Hartley, 2008; Kinder, 2012; Crosby et. al., 2017; Torfing and Ansell, 2017). Some scholars label public sector innovation as ‘linking capacity’ due to its potential to restore lost connections between governments and their citizens (Bekkers et. al., 2011). These features of public sector innovation imply that public organizations need to innovate to retain legitimacy in environments characterized by ever-increasing complexity.

Odense, a large Danish municipality, acknowledged that this was the case when the financial crisis broke out in 2008. The Danish parliament approved restrictions that implied substantial cutbacks in municipal budgets in the years to come shortly after the crisis. Faced with surges in uncertainty and environmental complexity, the municipality decided to focus on strengthening the innovative capacities of its service-delivering units. Encouraging managers at all levels to enhance their employees’ innovative behavior was one way this strategy was pursued. According to interviews with managers during implementation of the innovation strategy, the greatest challenge in the innovation process was arousing employee involvement. Managers in Odense municipality were aware that the innovation agenda would be derailed if employees did not seek to generate and implement new solutions to problems. However, the municipality did not outline how managers could support employees’ innovative work behavior. This study examines how different leadership styles employed by managers in schools and childcare centers in Odense affected their employees’ innovative behavior. The study thereby contributes with important practical knowledge for public managers facing similar challenges in the future.

Innovation and leadership are recurring themes in the public management literature (Vogel and Masal, 2015; De Vries, Bekkers and Tummers, 2016). Even though the linkages between the two have been assessed by public administration scholars (see Van der Voet, Kuipers & Groeneweld,
evolutions of different leadership styles in explaining innovative work behavior are rare (Ricard et al., 2017; Günzel-Jensen et al., 2017; Miao et al., 2017). Transformational leadership, here defined as a leadership style that seeks to make employees transcend their self-interests by developing, communicating, and sustaining a vision (Jensen et al., 2016), is often used to explain how leaders make changes in their organizations (Howell and Avolio, 1993; Jung, Chow and Wu, 2003). Most research on innovative work behavior therefore points to transformational leadership as an antecedent of innovative behavior (e.g. Reuvers et al., 2008; Aryee et al., 2012). However, the full-range theory of leadership suggests that transactional leadership styles, that is, exchange-oriented behaviors where managers reward satisfactory performance and penalize poor performance, should also be taken into account in predictions of employee behaviors (Pieterse et al., 2010). Surprisingly, very few studies incorporate both transformational and transactional leadership styles when assessing how leadership relates to innovative behavior. Only three articles include both types of behaviors (Pieterse et al., 2010; Khan, Aslam and Riaz, 2012; Günzel-Jensen et al., 2017) and only one study compares the effects of transformational and transactional leadership styles on innovative behavior (Günzel-Jensen et al. 2017). This is surprising since much of the leadership literature emphasizes how the two styles can be combined (Oberfield, 2012). To close this empirical and theoretical gap in research, we examine how transformational and transactional leadership styles affect employees’ innovative work behavior. Our research questions are: How do transformational and transactional leadership styles relate to public employees’ innovative work behavior? Are there any combined effects of transformational and transactional leadership styles on employees’ innovative work behavior?

To answer these questions, we comprehensively studied the innovation agenda in Odense municipality utilizing qualitative and quantitative methods. This paper applies data from a survey collected among teachers, pedagogues, and their leaders in Odense in 2015 (N = 1,292). We combine data from two sources to avoid common source bias. Leaders rate their leadership behaviors, and employees evaluate their innovative behavior.

The paper contributes to the literature about leadership and innovative behavior in several ways. First, it adds to the sparse literature that considers the effect of both transformational and transactional leadership on employees’ innovative work behavior and thereby acknowledges the principles in the full-range theory of leadership. Second, we study the combined effects of transformational and transactional leadership styles to gain a more detailed understanding of how different leadership styles spur innovative behavior among employees. Some scholars have
attempted to theorize how transformational and transactional leadership styles interact in influencing employee behavior, reaching widely different conclusions (Schriesheim et. al., 2006; Wang et. al., 2011; Nielsen et. al., 2017). Therefore, more research is needed on the interactive effects of leadership styles. Third, studies have examined the relationship between transformational leadership and innovative work behavior (Reuvers et al., 2008; Abbas et al., 2012; Aryee et al., 2012; Nusair, Ababneh and Kyung Bae, 2012). However, almost all use the Multifactor-Leadership Questionnaire (the MLQ) to measure transformational leadership (Basu and Green, 1997; Pieterse et al., 2010; Aryee et al., 2012; Nusair, Ababneh and Kyung Bae, 2012). The MLQ has recently been criticized for confounding leadership styles with their expected effects and for its unclear dimensional structure of concepts (Yukl, 1999; van Knippenberg and Sitkin, 2013). This criticism is highly relevant when we study innovative work behavior. Intellectual stimulation of followers is a defining feature of transformational leadership in the MLQ, but intellectual stimulation and innovative behavior are closely related concepts. Thus, using the MLQ to test whether transformational leadership relates to innovative work behavior becomes problematic because it increases the likelihood of finding a positive relation between the two. This means that even though most existing studies find a positive relationship between transformational leadership and innovative work behavior, measurement biases may have affected these results. To overcome this issue, we apply a new measure developed by Jensen et al. (2016), which excludes intellectual stimulation from the measure of transformational leadership. Thereby, our study is among the first to conduct a rigorous test of the relationship between transformational leadership and employees’ innovative work behavior. Finally, all existing studies of innovative behavior and transactional leadership treat transactional leadership as a unidimensional construct. This study is, to our knowledge, the first to provide a more nuanced picture of the relation between transactional leadership and innovative behavior by studying three dimensions of transactional leadership, namely material rewards, verbal rewards, and contingent sanctions. We find remarkable differences in the effect of the three dimensions on employee innovative behavior, and we therefore suggest that future research should take the multidimensional nature of transactional leadership into consideration. By studying both transformational and several transactional leadership behaviors as possible antecedents of innovative behavior, we generate more nuanced knowledge for public managers who seek to encourage their employees’ innovative behavior.

In the next section we define innovative work behavior and argue why it is important to the study of innovation in public organizations. We conducted interviews with employees in the Children- and
Youth Department of Odense municipality prior to gathering the survey data, and we use information from these interviews to give examples of innovation and innovative work behavior in our case. Next, we explain the different leadership styles and derive hypotheses. We present setting, methods and results. We find a positive relation between transformational leadership and innovative behavior. Managerial use of verbal rewards (a part of the transactional leadership style) is also associated with more innovative behavior. Finally, there is a positive and significant interaction effect between transformational leadership and verbal rewards. We end the paper by discussing our results, and we highlight the theoretical and practical implications of the findings.

Public sector innovation

Researchers frequently note that the current era of governance is characterized by boundary-spanning problems that call for more innovation in the public sector (Crosby et. al., 2017). Though innovation may entail ‘unforeseen negative externalities’ (Torfing, 2018: 1), scholars recognize that several problems that public administrators face require increased focus on innovation (Torfing and Ansell, 2017; Crosby et. al., 2017). The pursuit of innovative solutions carries multiple benefits to public organizations such as increased effectiveness and efficiency (de Vries, Bekkers and Tummers, 2016) alongside more citizen involvement and collaboration, which increases the legitimacy of public service delivering units (Moore and Hartley, 2008; de Vries, Bekkers and Tummers, 2016; Torfing and Ansell, 2017). Despite the increase in risk that innovations often entail (Osborne and Brown, 2011; Jordan, 2014), it seems a reasonable goal for public organizations to enhance their innovative capacities given the environmental constraints they have faced in recent years. Thus, it is with good reason that scholarly attention has been paid to the topic of how to increase the innovativeness of the public sector. Several promising strategies have emerged from this line of inquiry.

First, collaborating with stakeholders, such as users, citizens, and private organizations, seems a viable method when seeking to enhance public-sector innovation (Crosby et. al., 2017; Torfing and Ansell, 2017). Since collaborative innovation is a strategy that allows for increasing public value, this approach is tailored to a public setting where it is a salient goal that stakeholders are likely to be interested in pursuing (Torfing, 2018). In our case, collaborations with users and citizens stood out as a central premise behind the innovation strategy. The argument for involving citizens in the service delivery was, that “we have to lift the tasks together to succeed [...] we consider] both how to draw resources into the schools and how the local area can be used as an active part of the
teaching and learning environment” (interview with an administrative manager in Odense municipality). Thus, the innovation strategy emphasized the importance of involving both citizens (for example involving parents and grandparents in teaching activities at the schools) and users (for example letting older children from the schools teach younger children in the childcare centers).

Second, some scholars consider autonomy and room for experimentation important antecedents of innovation in the public sector (Wynen et. al., 2014). This strategy is promising to the extent that politicians are willing to allow for more risk-taking at the expense of a higher probability of receiving blame. However, in our case, the schools and childcare centers faced severe cutbacks, and the innovation strategy was strategically communicated from the top level as an effort to “do more [quality] with less [money]” (interview with an administrative manager in Odense municipality). Therefore, most of the managers in our case did not experience the innovation strategy as a provision of more autonomy.

The third theoretical line of inquiry into public sector innovation focuses on the dyadic relation between managers and employees and stipulates that innovation can be achieved in the public sector by focusing on increasing employees’ innovative behavior (Bysted and Hansen, 2015; Miao et. al., 2017). Managers can remove obstacles (e.g. red tape) and make barriers to employee innovation disappear (Moynihan, Wright and Pandey, 2012), or they can more actively seek to motivate their followers through their leadership behaviors (Miao et. al., 2017; Günzel-Jensen et. al., 2017). In our case, many managers saw this as the main challenge. Therefore, this paper focuses on how managers may affect innovative behavior among their employees.

**Employee innovative behavior**

Innovative work behavior is ‘the intentional generation, promotion, and realization of new ideas within a work role, work group or organization, in order to benefit the role performance, the group or the organization’ (Janssen, 2003: 348). Innovative work behavior consists of three phases: idea generation, idea promotion, and idea realization. In the first phase, employees use their creativity to produce new ideas or they search for practices in similar entities. When an idea has been developed, it is vital to encourage adoption of the idea by seeking out a coalition of sponsors around it. This phase is labeled idea promotion. Finally, the employee has to engage in idea realization to be
innovative, i.e., translate the idea into a procedure that can be used in the organization (Scott and Bruce, 1994; Janssen, 2000).

Interviews with managers and other stakeholders in our case revealed that innovative behavior in the Children and Youth Department of Odense Municipality for teachers included, among other things, implementing teaching methods that seek to make the children more physically active and in general include the students more in lectures in the school setting. Furthermore, it included collaborations with other professional groups to integrate perspectives and competencies among stakeholders from the children’s spare-time activities (e.g. sport or music) and general healthcare into different teaching activities. For the pedagogues, innovative behavior also meant collaboration with other professional groups and rethinking pedagogical methods to improve learning processes for the children. Innovative behavior in the present setting thus implied a strong focus on including children and other stakeholders more actively in new methods to improve their learning.

Leadership Styles and Innovative Work Behavior

If we turn to the question of how managers may support innovative behavior, research has examined the relations between innovative work behavior and leadership styles in different ways, for instance focusing on Leader-Member Exchange (LMX) (Kheng and Mahmood, 2013), humorous leadership (Pundt, 2015), shared leadership (Hoch, 2013), and dark triad traits (Wisse, Barelds and Rietzschel, 2015). However, transformational leadership is most often highlighted as an important antecedent to employees’ innovative work behavior (Pieterse et al., 2010; Aryee et al., 2012; Nusair, Ababneh and Kyung Bae, 2012).

The public administration literature on leadership has traditionally focused on how leaders can operate within the constraints posed by complex bureaucracies (Svara, 1994; Doig and Hargrove, 1990). Getting approval for one’s own ideas by political superiors or bureaucratic leaders was a crucial task that was often scrutinized by the leadership literature in public administration research (Fernandez, 2005). Norma Riccucci coined the term “execucrats” in her study of executive bureaucrats. She found that successful execucrats possessed political skills, management and leadership skills, and experience and expertise (Riccucci, 1995). Though much of the traditional literature on leadership in public administration has emphasized the political context, it has also been concerned with change. One of the primary research questions emanating from this line of
inquiry is how leaders in the public sector make their superiors support changes (Svara, 1994; Doig and Hargrove, 1990; Riccucci, 1995).

The evolution of leadership research in public administration has seen a continued focus on facilitating changes though focus has shifted from getting support from political superiors to making employees work towards changes (Vogel and Masal, 2016: 1178). This question has most often been investigated in the transformational leadership literature (Bass, 1985). Transformational leadership is a widely studied set of leadership behaviors (Judge and Piccolo, 2004).

Transformational leadership refers to an attempt by the individual leader to change his or her organization through softer means than coercive power (Bass, 1985). It is related to developing and communicating a vision to make employees transcend their own interests and work toward achieving organizational goals (Jensen et. al., 2016). By employing this soft leadership style, managers aim to motivate employees through their need for self-actualization and their values as opposed to leading through exchanges or authority relations (Bass, 1985). This attempt to make values salient may be especially important in public service organizations, since they typically have strong service and community-oriented goals (Wright, Moynihan, and Pandey, 2011). If the vision developed by the transformational leader in a public setting is more clearly articulated and persistent in the long run, it becomes easier to attract and motivate employees (Wright, Moynihan, and Pandey, 2011). This is highly relevant in the public sector, since the presence of public service motivation implies that developing a vision makes the mission of the organization more salient (Houston, 2006). This activates key aspects of the individual employee’s motivation, and therefore transformational leadership is seen as a crucial leadership tool for public managers.

Some authors point to weaknesses in transformational leadership (e.g. Basu and Green, 1997; Tourish, 2013). Transformational leaders can seem intimidating to their followers (Basu and Green, 1997). Furthermore, transformational leaders may suppress employee initiatives and neglect inputs by focusing on their own ideas for the organization (Tourish, 2013). In public settings, where collaborative innovation often turns out to be a solution to existing problems (Crosby et. al., 2017), it might not necessarily be desirable to focus on one’s own vision as a leader instead of letting user needs be communicated to employees who can then suggest changes to the leader. However, research still argues that a transformational leadership style might enhance employees’ innovative work behavior by inspiring and motivating them through a shared vision articulated in the organization (Pieterse et al., 2010). Most studies find a positive relation between the two (de Jong and Den Hartog, 2007; Reuvers et al., 2008; Abbas et al., 2012; Khan, Aslam and Riaz, 2012;
Afsar, F. Badir and Bin Saeed, 2014; Slåtten and Mehmetoglu, 2015). A few studies find insignificant or indirect effects (Pieterse et al., 2010; Aryee et al., 2012; Miao, Newman and Lamb, 2012; Pundt, 2015), and only one study reports a negative association (Basu and Green, 1997).

However, all research reported thus far on the relation between transformational leadership and innovative behavior uses the MLQ to measure transformational leadership. The MLQ has been criticized for various reasons, the most important being that transformational leadership is defined as a leadership style that instills pride in the organization, motivates followers, and stimulates employees intellectually (van Knippenberg and Sitkin, 2013). The latter is problematic when we study the relation between transformational leadership and innovative work behavior, since the questions used to measure intellectual stimulation are reminiscent of the items used to measure idea generation, which is a component of innovative behavior. As a result, the literature on transformational leadership and innovative behavior may have been biased towards finding a positive relation between the two. In accordance with Jensen et al. (2016), we here define transformational leadership ‘as behaviors that seek to develop, share, and sustain a vision’, thus focusing on managerial development, communication, and perseverance in achieving a vision (Jensen et al., 2016). With this definition, intellectual stimulation is not a component of transformational leadership, and we avoid the problematic bias toward finding a positive relation between transformational leadership and innovative work behavior. In this way, we test the impact of transformational leadership on innovative behavior more rigorously than previous research.

We hypothesize that transformational leadership has positive implications that could make it a viable strategy for managers to increase their employees’ innovative behavior, especially in a public setting. First, because the literature consistently shows that transformational leadership is a significant driver of change in public organizations (Van der Voet, Kuipers and Groeneveld, 2016; Fattore, Iacovone and Steccolini, 2017). Change-oriented citizenship behavior, which is closely related to innovative behavior, is positively affected when leaders develop and sustain a vision (Choi, 2007). This may be particularly relevant in a complex environment, which often surrounds public organizations. In such a setting, managers can help employees make sense of their situation by using a transformational leadership style (Van der Voet, Kuipers, and Groeneveld, 2016). This helps employees execute their tasks (Van der Voet, Kuipers, and Groeneveld, 2016), which can allow for more room for innovative behavior. Second, because red tape often impedes public sector innovation (Van der Voet, Kuipers, and Groeneveld, 2016; Crosby et. al., 2017). Red tape is mitigated by transformational leadership because it creates goal clarity and removes employees’
sense of obstacles in their organization (Wright, Moynihan and Pandey, 2012). Thus, the transformational leader can remove some of the environmental constraints that hinder innovation in public organizations. Therefore, our first hypothesis is:

H1: Leaders’ use of transformational leadership is positively related to innovative work behavior.

Transactional leadership is another widely studied leadership behavior (Judge and Piccolo, 2004). Transactional leaders use exchanges to align employees’ interests with the needs of the organization (Burns, 1978). However, there are only few studies of how transactional leadership relates to innovative behavior, and they produce mixed results. Pieterse et al. (2010) find a negative relationship, whereas Khan et al. (2012) report a positive association. Finally, Günzel-Jensen and colleagues (2017) find that transactional leadership is positively related to innovative behavior, though this association disappears after controlling for other leadership styles. All existing studies treat transactional leadership as a unidimensional construct. However, psychological research has demonstrated that material and verbal rewards may have entirely different effects (Deci, 1971; Jensen et al., 2016), and we therefore argue, that it is important to hypothesize the expected relations between innovative behavior and these leadership styles separately. In our analysis, transactional leadership is defined through three dimensions, namely verbal rewards, material rewards, and contingent sanctions (Jensen et al., 2016), which are all based on employees’ actions and seek to affect employees’ self-interests through the use of different tools. In this way, it is possible to lay the ground for a more nuanced understanding of how transactional leadership affects innovative behavior.

The first component of transactional leadership is material rewards for satisfactory performance. We argue for a negative association between material rewards and employees’ innovative behavior because research has shown that material rewards crowd out intrinsic motivation (Gagne and Deci, 2005). Scholars have also pointed out that this crowding effect even occurs in public settings, even though material rewards are significantly smaller than in private organizations (Andersen and Pallesen, 2008). Since intrinsic motivation is an important antecedent of innovative work behavior (Chen, Li and Leung, 2016), we propose that:

H2: Leaders’ use of material rewards is negatively related to innovative behavior.
Verbal rewards for satisfactory performance are another component in transactional leadership. Unlike material rewards, verbal rewards do not crowd out intrinsic motivation because they are intangible and may be indistinguishable from the joy an employee receives from performing a task (Deci, 1971). Instead, verbal rewards enhance feelings of competence as well as emphasize the behaviors the manager supports and may therefore increase employees’ motivation to innovate. Consequently, our third hypothesis is:

H3: Leaders’ use of verbal rewards is positively related to innovative behavior.

Contingent sanctions are used to make employees aware of the consequences of inadequate performance. An environment that supports risk-taking is conducive to innovation at the organizational and individual level (Brown and Osborne, 2013; Clark, 2016; Flemig, Osborne and Kinder, 2016; Ricard et al., 2017). If managers use contingent sanctions too often, employees may be discouraged from innovative behavior because failure is too costly. Our fourth hypothesis is:

H4: Leaders’ use of contingent sanctions is negatively related to innovative behavior.

The full-range theory of leadership points out that transactional leadership can be applied in conjunction with transformational leadership to the extent that the leader believes that it can help achieve his or her vision (Bass and Avolio, 1993). The traditional literature on the subject stipulates that transformational leadership adds to transactional leadership styles and makes them more effective in influencing followers (Judge and Piccolo, 2004). However, this hypothesis has seldom been tested, and the sparse literature arrives at widely different conclusions (Schriesheim et al., 2006; Wang et al., 2011). Therefore, it is still important to consider how transformational and transactional leadership styles interact in influencing employee behavior. Furthermore, as the literature so far has treated transactional leadership as a unidimensional construct, it might supply the field with a more nuanced understanding of the leadership style and its consequences by focusing separately on material rewards, verbal rewards, and contingent sanctions and theorize about their expected interactions with transformational leadership independently.

Transformational leadership used in combination with material rewards may not encourage innovative behavior since the two leadership styles aim at influencing very different employee attitudes. Where transformational leadership seeks to make employees transcend their self-interests and work towards achieving the organizational vision, material rewards target employee self-interests and control their behavior through incentives (Jensen et al., 2016). Therefore, in a
situation where a manager uses transformational leadership and material rewards, employees may feel less inclined to use innovative behaviors to work towards the vision because they receive unclear signals from the leader. This might imply that transformational leadership does not affect innovative behavior as strongly if managers use material rewards to a high extent. Therefore, we propose that:

H5: Material rewards negatively moderate the association between transformational leadership and innovative behavior

The combination between transformational leadership and verbal rewards may encourage innovative behavior. Verbal rewards can increase employee motivation and show which behaviors the manager appreciates. Furthermore, the use of verbal rewards does not pose the same demands on employees that are inherent to material rewards, in which there is an element of control (Deci, 1971). Verbal rewards can thereby be used by the transformational leader to increase the efficacy of employees while signaling the behaviors that he or she believes contributes to achieving the vision. Employees can thereby more easily understand how their work helps achieve the vision, and they may become more motivated as a result. Our sixth hypothesis therefore becomes:

H6: Verbal rewards positively moderate the association between transformational leadership and innovative behavior.

Contingent sanctions contain the same element of control that is inherent in material rewards. Control has the potential to crowd out intrinsic motivation (Frey and Jegen, 2001), and if this happens then the supposedly positive effects of transformational leadership are mitigated. While no leader can perform his or her duty without using sanctions, applying them to a very high extent may enforce the belief that innovation is risky in the public sector (Flemig and Osborne, 2013; Clark, 2016). As a result, the vision articulated by the transformational leader may influence innovative behavior less since employees fear that it entails a high risk of receiving blame. Thus, our final hypothesis is:

H7: Contingent sanctions negatively moderate the association between transformational leadership and innovative behavior.

Data and methods
We collected data from the Children and Youth department in Odense, a large Danish municipality with approximately 200,000 residents that has worked with an innovation agenda for the last five years. All leaders in the municipality were encouraged to enhance their employees’ innovative behavior through leadership, but neither a transformational nor a transactional leadership style was dictated from the top. The unit of analysis is an employee in a school or a daycare institution, and our sample thus consists of teachers, pedagogues, and their managers.

The data is gathered from randomly selected schools and childcare centers in the municipality. We sent 1293 questionnaires with a response rate of 65%. Leaders were more responsive. They received 113 questionnaires and the response rate was 91%. The response rates are high in comparison with other research projects sampling public employees and managers.

We measure the independent variables through survey data collected from the employees’ immediate supervisors (a total of 62 leaders). These leaders are closer to the employees in their daily work than the higher-level managers, and their leadership behaviors are therefore more relevant for the innovative behavior of employees due to more frequent interactions.

Missing respondents and survey items are excluded from the analysis. The final analyses utilize 517 responses of the total 1292, which means that the response rate for these analyses is 40%. 78.8% of the survey respondents were female. Respondents’ ages range from 20 to 69, and the average age is 46. We tested for differences between respondents and non-respondents and found no significant differences (see Appendix A).

The dependent variable in the study is employees’ evaluation of their innovative work behavior, and the independent variable is leaders’ responses to survey questions regarding their use of transformational and transactional leadership behaviors. The use of self-reported behavior in both groups in the data allows us to handle two common problems in the literature. First, many studies suffer from common-source bias, since the dependent and independent variable are employee reports (Imran & Haque, 2011; Choi et al., 2016; Reuvers et al., 2008; Nusair et al., 2012; Pundt, 2016; Slåtten & Mehmetoglu, 2016). It has been convincingly demonstrated that common-source bias might result in inflated estimates (Jakobsen & Jensen, 2015). Second, several studies have tried to mitigate this problem by using employee survey data to measure transformational leadership (Pieterse et al., 2010; Aryee et al., 2012; Afsar et al., 2014). However, this might result in biased measures for transformational leadership due to the halo effect, i.e., employees judge charismatic and trustworthy leaders to be more engaged in developing a vision (Carless, 1998). Follower ratings
of leader behaviors may thus be subject to the biases associated with the MLQ, where desirable leader behaviors are attributed to effective and likeable leaders. Many other types of biases may contaminate follower ratings of leadership behavior as well (Hansbrough et al., 2015). However, the managers’ self-ratings of their active leadership behaviors may also be inflated. The same is the case for employee ratings of their innovative behavior, which may be prone to social desirability bias. But it would be very surprising if this tendency towards inflated measures correlated for leaders and their followers (Fleenor et al., 2010; Jacobsen and Andersen, 2017). Consequently, we argue that self-reported behavior by leaders and employees is least likely to introduce systematic biases in the study. This is supported by the fact that our measure of transformational leadership has proved both reliable and valid when leaders assess their own behavior (Jensen et al., 2016).

Researchers have found a moderate association between intended leadership styles (as rated by the supervisor) and perceived leadership practices (rated by the employee), since employees have to perceive that leaders use a given leadership style in order to report that the manager makes use of it (Jacobsen and Andersen, 2015). By using leaders’ measures of their own behavior, we achieve a more conservative test of the relation between leadership styles and innovative behavior. This feature of the study combined with the fact that we do not use the MLQ-measure of leadership practices implies that our study is one of the most rigorous tests of the association between leadership styles and innovative behavior to this date. Given these two aspects of our data, we expect effect sizes to be modest and that finding effects in the expected direction strongly corroborates our hypotheses.

Measures

**Innovative behavior**

Innovative behavior includes the generation, promotion, and realization of new ideas by employees (Scott and Bruce, 1994). Some scholars only use idea generation and idea realization (Bysted and Jespersen, 2014); others emphasize idea promotion as an important component of the concept (Scott and Bruce, 1994; Janssen, 2000). We include all three in the concept of innovative behavior. The items used to measure innovative behavior are listed in Appendix B.

The next question concerning the measurement of innovative behavior is whether to separate it into three dimensions or view it as a unidimensional construct. Most studies use one dimension because
the multidimensionality of the concept has yet to be proven (Scott and Bruce, 1994; Wang et al., 2015). Both options are valid, but we choose one dimension based on confirmatory factor analyses (the analyses are available on request).

**Transformational leadership**

The nature and measurement of the concept of transformational leadership has been widely debated over the last twenty years (Yukl, 1999; van Knippenberg and Sitkin, 2013; Jensen et al., 2016). Several scholars criticize the MLQ as applied in traditional leadership research (Bass, 1990; Burns, 1978; Judge and Piccolo, 2004) on the grounds that it confounds leadership styles with their effects (Yukl, 1999; van Knippenberg and Sitkin, 2013), it is unclear how the dimensions are defined and how they relate (van Knippenberg and Sitkin, 2013; Tummers et al., 2016), and finally the suggested dimensional structure is seldom found in studies applying the measure (van Knippenberg and Sitkin, 2013; Tummers et al., 2016). Due to these inadequacies, scholars have considered new ways to conceptualize and measure transformational and transactional leadership. We apply a measure developed by Jensen et al. (2016) that supposedly overcomes the shortcomings of MLQ. They conceptualize transformational leadership as a type of behavior that attempts to make employees transcend their own interests by developing, communicating, and sustaining a vision (Jensen et al., 2016). By focusing on how leaders generate and sustain a vision, this measure captures what the existing research argues is the core of a leadership style that seeks to transform (Bass, 1997; Shipman, Byrne and Mumford, 2010). The most important difference in this setting is that the leadership style is not defined through expected effects (as a style that stimulates employees intellectually) and therefore do not have a conceptual overlap with innovative work behavior.

The questions used to measure the concept can be seen in Appendix B. A confirmatory factor analysis suggests that a unidimensional conceptualization of transformational leadership fits the data well (available upon request). Cronbach’s alpha is .89, which indicates good internal consistency.

**Transactional leadership**

15
Transactional leadership comprises the three dimensions, material rewards, verbal rewards, and contingent sanctions. Their unifying characteristic is that they are formed by reactions to employee performance and with different tools seek to align the employees’ and the organization’s interests.

Material rewards: Transactional leadership includes the use of tangible rewards contingent on performance (Bass, 1990; Howell and Avolio, 1993). We use Jensen et al.’s (2016) measure, which is similar to the contingent reward dimension in the MLQ (Howell and Avolio, 1993) (see questions in Appendix B). A confirmatory factor analysis reveals that the items load significantly on the latent construct of material rewards (available upon request). Furthermore, a Cronbach’s Alpha-value of .88 shows good internal consistency of the measure.

Verbal rewards: Material and verbal rewards may have different effects, and we therefore distinguish between the two (Jensen et al., 2016) (see questions in Appendix B). A confirmatory factor analysis shows that all items load strongly on the verbal rewards factor, except the item ‘As a leader I generally do not acknowledge individual employees even though they perform as required’ (available upon request). We exclude this item from the index which then yields a Cronbach’s alpha of .75.

Contingent sanctions: Contingent sanctions are used in response to performance shortfalls (Jensen et al., 2016). In the MLQ, the corresponding dimension is ‘active management by exception’ (Bass, 1985). We measure this leadership style as Jensen et al., 2016 suggests (see Appendix B). Cronbach’s alpha is .92 for the index.

Control variables: We control for tenure and age, which have been found to be correlated with several work behaviors (Ng and Feldman, 2008). We also control for gender, since men may be more risk seeking (Byrnes, Miller and Schafer, 1999), and scholars have noted that innovation attempts represent a risky work behavior (Clark, 2016; Flemig, Osborne and Kinder, 2016; Ricard et al., 2017). Job position is also included as a control variable because the innovation agenda in Odense Municipality may have affected different work groups in different ways. Finally, we control for organizational size because research has shown that it is more feasible to create a vision (and thereby perform transformational leadership) in larger organizations (Krøtel, Villadsen and Hansen, 2017) (see Appendix B for measurement of the control variables).
Estimation strategy

The data structure in which employees are nested in institutions or schools with a corresponding immediate supervisor makes a hierarchical model well suited for our research purposes. Leadership styles are level-2 variables assessed by the employees’ immediate supervisors, and innovative work behavior is measured based on employees’ self-rated behaviors.

A hierarchical model is a compromise between complete pooling, in which variation at a higher level is ignored, and no pooling, in which all group indicators are included. The former ignores differences between groups, whereas the latter tends to overestimate them (Gelman and Hill, 2007). To ease interpretation of the models and be able to compare effect sizes, all leadership style variables are standardized, which means that the effect sizes for the primary independent variables are Cohen’s d.

We use hierarchical models with random effects, since we cannot apply fixed effects when our primary independent variable is situated at the highest level of analysis. We allow the intercepts to vary between groups in the model. We nearly obtain the same results when we also allow the slopes to vary between groups. We have conducted several analyses to estimate the robustness of our findings. Linear regression yields the same estimates as multilevel models with random effects. Furthermore, multilevel probit models give very similar estimates, with the exception that transformational leadership becomes marginally insignificant. It thus makes little difference whether we treat the dependent variable as continuous or ordinal. Finally, we have controlled for other explanations of innovative behavior in the literature, such as peer group exchange and innovation climate. Again, the estimates change very little, and transformational leadership becomes slightly insignificant. All these findings are true for both main effects and interaction models. It seems that our results are robust to different model specifications. The estimates are not shown here but they are available upon request.

Results

Descriptive statistics for all the variables in the analysis and a correlation matrix are reported in Appendix D. We include five models in the following section that estimate the associations between leadership styles and innovative behavior. First, we report a baseline model in which all controls are included. Next, we show the associations between the different leadership styles and innovative
behavior by including transformational leadership, material rewards, verbal rewards, and contingent sanctions.

[Table 1 about here]

The baseline model shows that none of the control variables are significant predictors of innovative behavior. Model 2 shows the association between transformational leadership and innovative behavior. As expected in hypothesis 1, there is a significant positive relation between transformational leadership and innovative behavior \((p = .05)\). Even though there is a significant association between innovative work behavior and transformational leadership, a Cohen’s \(d\) for the coefficient of .12 is interpreted as a small effect size. The effect is not as large as we would expect when we compare our results to the extant literature (e.g. Aryee et al., 2012; Choi et al., 2016). We will discuss this further below. Model 3 shows no negative relation between material rewards and innovative behavior as expected in hypothesis 2. Thus, managerial use of material rewards does not seem to affect the innovative behavior of employees in our data. Model 4 reveals a positive association between verbal rewards and innovative behavior as expected in hypothesis 3. A Cohen’s \(d\) of .14 suggests that this effect size is also small. The effect size of verbal rewards on innovative behavior is not large but similar to that of transformational leadership. Hypothesis 4 expected that contingent sanctions are negatively related to innovative behavior. However, model 5 displays an insignificant association between the two. Concluding on the main effects of leadership, it seems that transformational leadership and verbal rewards are positively related to innovative behavior. However, by combining different leadership styles, a leader may obtain a higher likelihood of employee innovative behavior as we argued in hypothesis 5 through 7. In table 2, we therefore examine the different combinations of transformational and transactional leadership in relation to innovative work behavior.

[Table 2 about here]

We examine the interactions separately due to the high risk of multicollinearity if all variables are included in the same model. In table 2, the first model tests hypothesis 5. Contrary to the expectation of a negative moderation in the hypothesis, there is no significant association between innovative work behavior and the combination of transformational leadership and material rewards. Hypothesis 6 proposed that the use of verbal rewards is an important determinant of whether transformational leaders succeed in spurring innovative behavior in their employees. Model 2
suggests that this is the case. As expected, the interaction effect is positive and significant (p < .05). To get a grasp of the conditional effect of the two predictors, we draw interaction plots, which are displayed below.

[Figure 1 about here]

As Figure 1 shows, the marginal effect of transformational leadership is statistically indistinguishable from zero at lower levels of verbal rewards. However, it increases at higher levels of verbal rewards and becomes different from zero. Similarly, the effect of verbal rewards is indistinguishable from zero at lower levels of transformational leadership and becomes positive at higher levels of this leadership style. This means that the combination between transformational leadership and verbal rewards is important for the innovative behavior of employees, since high levels of both leadership styles increase employee innovative behavior. The effect sizes are not large but considering that leadership ratings are in general weakly related to follower behavior (Jacobsen and Andersen, 2015), our significant findings seem to strongly support our hypotheses. Finally, model 3 in table 2 shows no significant association between innovative work behavior and the combination of transformational leadership and contingent sanctions, which means that we do not find support for hypothesis 7. We will discuss these results further below.

Discussion and conclusion

This paper has examined how leaders in Odense municipality have fostered innovative behavior through their leadership styles. The municipality faced severe cutbacks and consequently chose to implement an ambitious innovation strategy. The following discussion will focus on how our findings yield practical advice to public managers in relation to achieving this linkage between their leadership styles and innovative behavior among their employees. We interpret the results by discussing them in relation to the context, which in our case is Odense municipality.

The results show that transformational leadership is an important antecedent of innovative behavior. This was to be expected based on the literature on transformational leadership and the studies that connect this leadership style to innovative behavior (e.g. Bass, 1985; Aryee et. al., 2012; Reuvers et. al., 2008). However, we conducted a more rigorous test of the relation than the extant literature. First, the study does not use the MLQ-measure for transformational leadership. This means that we examined the relation without the component “intellectual stimulation”, which bears strong
resemblance to the dependent measure, innovative behavior. Second, we used leader ratings of their own leadership styles. The literature has demonstrated how intended leadership practices are different from perceived leadership practices (Jacobsen and Andersen, 2015), which implies that we conducted a more conservative test of the theoretical expectation. When we still find a positive relation between the two, we strongly corroborate the common finding in the existing literature that transformational leadership increases innovative behavior (Aryee et. al., 2012; Reuvers et. al., 2008). Public managers thus need to create and develop a vision that clarifies how employee efforts contribute to achieving organizational goals. This motivates the employees (Chen, Li, and Leung, 2016) and may help overcome frequent barriers to public sector innovation such as unclear goals (Van der Voet et. al., 2015), and red tape (Moynihan, Wright, and Pandey, 2012).

Transactional leadership is largely overlooked in the literature on employee innovative behavior. It is traditionally viewed as a leadership style that aims at execution of daily tasks, whereas transformational leadership brings about changes of a higher order (Bass, 1985). In the public-sector literature, some scholars advise against the use of transactional leadership styles since they may crowd out intrinsic motivation (Perry, Engbers, and Jun, 2009; Jacobsen and Andersen, 2017).

In spite of this theoretical skepticism in relation to transactional leadership in public organizations, our findings do not show any damaging effects of this leadership style on innovative behavior. On the contrary, by recognizing the multidimensional nature of transactional leader behaviors, we find that verbal rewards are positively related to innovative behavior. Verbal rewards have the potential to clarify goals and show how employees contribute to them, which in turn increases motivation (Jacobsen and Andersen, 2017). When employees feel more competent, they might contribute to solving the ‘wicked and unruly problems’ (Torfing, 2018) that public organizations face these years. Therefore, it is important that public managers use verbal rewards if they want to pursue an innovation agenda successfully. Furthermore, they should not refrain from using other transactional leadership behaviors if the goal is to encourage innovative behavior, since we find no evidence of differences in innovative behavior at different levels of material rewards or contingent sanctions.

Finally, our study highlights the importance of combining different leadership styles to achieve higher levels of employee innovative behavior. Public managers are situated in complex environments where they often have to attend to several issues of a very different character, which means that they often have to combine different leadership styles to accommodate stakeholders’ expectations. Therefore, the study of whether some leadership styles undermine or strengthen the
relation between other leadership styles and innovative behavior of public employees is very important. Several scholars have tried to assess how transformational and transactional leadership styles can be combined and the effects on employee behavior of such combinations. The augmentation hypothesis stipulates that leaders should combine transformational and transactional leadership styles to reap the full benefits in terms of employee motivation (Bass and Avolio, 1993). However, the hypothesis also stipulates that the effects are additive (Nielsen et al., 2017). We find that the leadership styles interact in our study. The results suggest that transformational leadership is less efficient in increasing employees’ innovative behavior, if it is not combined with verbal rewards. It is crucial that public managers use verbal rewards for satisfactory performance if they choose a transformational leadership style with the goal of encouraging employee innovative behavior. Otherwise, there is no discernible effect of transformational leadership on innovative behavior. This implies that leaders’ effort to encourage innovation through the use of transformational leadership is wasted if it is not used in conjunction with verbal rewards.

Many public organizations are situated in environments that are hostile to innovation due to more scrutiny of risk-taking behavior (Flemig, Osborne, and Kinder, 2016) and the presence of unclear goals (Van der Voet et al., 2015). This may be why it is necessary to use both transformational leadership and verbal rewards to encourage the innovative behavior of employees in our case. Our interviews revealed that many teachers and pedagogues felt insecure in their job and perceived that the innovation strategy, which encouraged them to include and use competencies from other professional groups and/or even local non-professionals, threatened their position and professional discretion. Even though many employees agreed with the overall vision of the innovation strategy, they still hesitated to translate it into daily practice due to professional doubts and feelings of insecurity. In this situation it becomes very important that the leaders combine their communication of the vision with verbal rewards. Clearly communicating and sustaining the vision clarifies the overall goal and meaning of the innovation strategy, while verbal rewards may remove the sense of a hostile innovation environment in public organizations and make the daily translation of the strategy easier by guiding the employees’ behavior. In that way, the employees may feel that they can avoid the fear of taking risks and take the time to develop a new understanding of their professionalism. Therefore, managers increase the likelihood that their employees devote efforts to working towards an innovation agenda through this combination of leadership styles and thereby they come one step closer to innovating their organizations.
Like all research, this study has limitations. First, the cross-sectional nature of the data does not allow us to make causal inferences regarding leadership styles and innovative behavior. Endogeneity may account for some of the observed associations, since leaders may have more time and surplus in developing a vision and praising employees if they already are innovative. However, we find low degrees of variation between institutions in innovative behavior, which suggests that such an explanation cannot account for much of the association between leadership styles and innovative behavior. Second, social desirability bias (SDB) may also affect our results, since both leaders and employees rate their own behaviors. However, it would be surprising if the errors generated by social desirability correlate (Fleenor et al., 2010). Thus, we may not estimate the effects correctly due to SDB but it would be surprising if the association between the leadership styles and innovative behavior stems from SDB. All in all, the data obtained through leader ratings is negatively skewed, which means that we cannot estimate the associations between leadership styles and innovative behavior at the lower levels of transformational leadership and verbal rewards. This dampens the precision of our research but it should not lead us to erroneous conclusions about the direction of the relationship, since fewer observations at the lower end of the independent variables should attenuate the coefficients. All in all, the use of leader self-reports and the application of another measure than the MLQ makes our tests very conservative. Therefore, we believe that the study provides strong support for the findings. We could not dive into the theoretical mechanisms and give more nuanced advice to public managers because we apply quantitative data. We sought to gather more knowledge about the context by interviewing managers and employees in Odense and conducting the survey. However, the study rests on more simplifying assumptions due to the nature of our data. Finally, the complex nature of innovation in public services implies that our models did not explain much of the variance in the dependent variable, innovative behavior. We tried to include other explanations for innovative behavior to decrease the risk of model misspecification, though this did not significantly improve the model fit.

Despite the limitations, this study still offers new and important knowledge with practical implications for public management. Our overall findings suggest that transformational leadership and a specific component of transactional leadership, i.e., verbal rewards, were positively related to innovative work behavior. Furthermore, both transformational leadership and verbal rewards are more effective in ensuring innovative behavior when combined. Public managers may thus benefit from applying transformational leadership tools in the form of a clear vision that is shared and sustained continuously, and from applying transactional leadership tools (verbal rewards) when
seeking to increase employee innovative behavior. Verbal rewards may be used as a strong signal that employees are working in the right direction in achieving the vision. Conversely, the absence of verbal rewards may leave the employees frustrated and with increased fear of taking risks, thereby reducing their innovative behaviors. Still, more work is needed to highlight how public managers encourage innovation in their organizations. Employee innovative behavior is only the first step towards public-sector innovation, which often happens in complex networks of employees, citizens, users, and other stakeholders (Torfing and Ansell, 2017; Crosby et. al., 2017; Torfing, 2018). Future research should examine the complex milieux that surround public-sector innovation to provide more comprehensive advice as to how managers innovate their organizations. We lack the full view of how managers succeed in including citizens and users, such that all stakeholders contribute to innovation and finding solutions to public organizations’ problems in a world of ever-increasing challenges and demands.
References


Appendix A: Differences between respondents and non-respondents

Table 1. Binary logistic regression with covariates as predictions of response to the survey.

<table>
<thead>
<tr>
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<th>(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.435 (.44)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.002 (.09)</td>
</tr>
<tr>
<td>Tenure</td>
<td>-0.056 (.05)</td>
</tr>
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</table>

Job position – Reference category: Teacher

<table>
<thead>
<tr>
<th>Job Position</th>
<th>Coefficient (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head teacher</td>
<td>0.531 (.77)</td>
</tr>
<tr>
<td>Pedagogue</td>
<td>0.372 (.51)</td>
</tr>
<tr>
<td>Pedagogical assistant</td>
<td>Omitted (all responded)</td>
</tr>
<tr>
<td>Pedagogical helper</td>
<td>1.694 (.99)</td>
</tr>
<tr>
<td>Other</td>
<td>-0.319 (.75)</td>
</tr>
<tr>
<td>Organizational size</td>
<td>-0.007 (.006)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.646*** (.9)</td>
</tr>
<tr>
<td>Observations</td>
<td>541</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.033</td>
</tr>
</tbody>
</table>

Note: * p≤0.05, ** p<0.01, *** p<0.001. Cluster robust standard errors in parentheses.
Appendix B: Measures

**Innovative behavior** (Scott & Bruce, 1994)

I generate new ideas to solve problems
I search for new work methods, techniques, or instruments
I contribute with original solutions to our problems
I am good at getting support for innovative ideas
I make important people in my organization enthusiastic about innovative ideas
I translate innovative ideas into useful solutions
I introduce innovative ideas in a systematic way
I evaluate the usefulness of innovative ideas

Answering categories: Never (1), Rarely (2), Occasionally (3), Sometimes (4), Often (5), Mostly (6), Always (7).

**Transformational leadership** (Jensen et al., 2016)

As a leader I...
Concretize a clear vision for the organization’s future
Communicate my vision of the organization’s future
Make a continuous effort to generate enthusiasm for the organization’s vision
Have a clear sense of where I believe our organization should be in 5 years
Seek to make employees accept common goals for the organization
Strive to get the organization to work together in the direction
Strive to clarify for the employees how they can contribute to achieve the organization’s goals

Answering categories: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5).

**Transactional leadership** (Jensen et al., 2016)

**Verbal rewards**

As a leader I...
Give individual employees positive feedback when they perform well
Actively show my appreciation of employees who do their jobs better than expected
Personally compliment employees when they do outstanding work

Answering categories: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5).

**Material rewards**

As a leader I...

*Reward the employees’ performance when they live up to my requirement*
*Reward the employees dependent on how well they perform their jobs*
*Point out what employees will receive if they do what is required*
*Let employees’ effort determine received rewards*

Answering categories: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5).

**Contingent sanctions**

As a leader I...

*Give negative consequences to the employees if they perform worse than their colleagues*
*Make sure that it has consequences for the employees if they do not consistently perform as required*
*Take steps to deal with poor performers who do not improve*
*Give negative consequences to my employees if they do not perform as I require*

Answering categories: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), Strongly agree (5).

**Control variables**

Gender: Female (0), Male (1).
Tenure (measured in years): 0-2 (0), 3-4 (1), 5-6 (2), 7-8 (3), 9-10 (4), 11-12 (5), 13-14 (6), 15-16 (7), 17-18 (8), 19-20 (9), 21-22 (10), 23-24 (11), 25 years (12), more than 25 years (13).
Job position: Teacher, Head teacher, Pedagogue, Pedagogical helper, Pedagogical assistant, Other.
Organizational size (measured as number of employees): 30-40 (0), 41-50 (1), 51-60 (2), 61-70 (3), 71-80 (4), 81-90 (5), 91-100 (6), 101-110 (7), 111-120 (8).
Appendix C: Descriptive statistics and correlation matrix

Table: Descriptive statistics.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>St. dev.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational leadership (standardized)</td>
<td>62</td>
<td>-.151</td>
<td>1</td>
<td>-2.6, 2.3</td>
</tr>
<tr>
<td>Verbal rewards (standardized)</td>
<td>62</td>
<td>-.001</td>
<td>1</td>
<td>-2.7, 1.4</td>
</tr>
<tr>
<td>Material rewards (standardized)</td>
<td>62</td>
<td>-.121</td>
<td>1</td>
<td>-1.9, 1.9</td>
</tr>
<tr>
<td>Contingent sanctions (standardized)</td>
<td>62</td>
<td>.32</td>
<td>1</td>
<td>-2.4, 1.9</td>
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<td>Innovative behavior</td>
<td>709</td>
<td>4.44</td>
<td>1.02</td>
<td>1, 7</td>
</tr>
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<td>Organizational size</td>
<td>987</td>
<td>4.27</td>
<td>2.3</td>
<td>0, 8</td>
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<tr>
<td>Age</td>
<td>753</td>
<td>4.39</td>
<td>1.94</td>
<td>0, 9</td>
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<td>Tenure</td>
<td>703</td>
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<td>4.24</td>
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<td>Gender</td>
<td>768</td>
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<td>.409</td>
<td>0, 1</td>
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**Job position**

<table>
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<tr>
<th>N</th>
<th>Percentage</th>
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<td>Teacher</td>
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<tr>
<td>Head teacher</td>
<td>94</td>
</tr>
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<td>Pedagogue</td>
<td>310</td>
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<td>Pedagogical assistant</td>
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<td>Pedagogical helper</td>
<td>90</td>
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<tr>
<td>Other</td>
<td>65</td>
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Table: Correlation matrix.

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Transformational leadership (standardized)</td>
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<td>Verbal rewards (standardized)</td>
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<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material rewards (standardized)</td>
<td>.086</td>
<td>.596</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingent sanctions (standardized)</td>
<td>.447</td>
<td>.335</td>
<td>.193</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Innovative behavior</td>
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<td>.11</td>
<td>-.021</td>
<td>.051</td>
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<td></td>
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<td>-.215</td>
<td>-.226</td>
<td>-.11</td>
<td>-.05</td>
<td>1</td>
<td></td>
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<tr>
<td>Age</td>
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<td>-.037</td>
<td>.057</td>
<td>-.043</td>
<td>-.071</td>
<td>.064</td>
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<tr>
<td>Tenure</td>
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<td>-.099</td>
<td>.039</td>
<td>.015</td>
<td>-.055</td>
<td>.071</td>
<td>.597</td>
<td>1</td>
<td></td>
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<tr>
<td>Gender</td>
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<td>-.069</td>
<td>.043</td>
<td>.013</td>
<td>-.025</td>
<td>-.04</td>
<td>-.039</td>
<td>.027</td>
<td>1</td>
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Appendix E: Including other antecedents of innovative behavior

Here we control for other antecedents of innovative behavior in the literature. These are peer-group exchanges and an innovation climate. We only show the results for the models with significant coefficients (that is for transformational leadership and verbal rewards). The covariates do not change the results for the models not shown here.

Peer group exchanges (employee ratings):

I feel that my colleagues take my ideas seriously
I am confident that my colleagues will listen to my ideas
I feel that my colleagues respect me
I know that I will benefit from a good idea, even though I have presented it for my colleagues first

Cronbach’s alpha: .92

Innovation climate (leader ratings):

We search for new ways of completing tasks in my organization
We are not afraid to fail when trying new things in my organization
There is no room for mistakes in my organization (R)

Cronbach’s alpha: .63
Table 1. Multilevel hierarchical regressions with innovative behavior as the outcome.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
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<tbody>
<tr>
<td>Gender</td>
<td>-.07 (.11)</td>
<td>-.05 (.11)</td>
<td>-.06 (.11)</td>
</tr>
<tr>
<td>Age</td>
<td>-.06* (.03)</td>
<td>-.06* (.03)</td>
<td>-.06* (.03)</td>
</tr>
<tr>
<td>Tenure</td>
<td>-.00 (.01)</td>
<td>-.00 (.01)</td>
<td>.00 (.01)</td>
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</table>

Job position – Reference category: Teacher

<table>
<thead>
<tr>
<th>Job Position</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head teacher</td>
<td>.09 (.22)</td>
<td>.09 (.22)</td>
<td>.11 (.22)</td>
</tr>
<tr>
<td>Pedagogue</td>
<td>.21 (.16)</td>
<td>.18 (.16)</td>
<td>.23 (.16)</td>
</tr>
<tr>
<td>Pedagogical assistant</td>
<td>-.05 (.17)</td>
<td>-.06 (.17)</td>
<td>.00 (.17)</td>
</tr>
<tr>
<td>Pedagogical helper</td>
<td>-.39 (.21)</td>
<td>-.41* (.2)</td>
<td>-.38 (.21)</td>
</tr>
<tr>
<td>Other</td>
<td>.26 (.19)</td>
<td>.25 (.19)</td>
<td>.28 (.19)</td>
</tr>
</tbody>
</table>

| Organizational size      | -.01 (.02) | -.00 (.03) | -.01 (.02) |
| Transformational leadership | .09 (.06) | .02 (.06) | .12* (.05) |
| Verbal rewards           | .1* (.05) | .1* (.05) | .11 (.06) |
| Peer group exchange      | .12* (.06) | .11 (.06) | .11 (.06) |
| Innovation climate       | -.00 (.09) | .03 (.08) | -.09 (.08) |

Transformational * Verbal | .12* (.05) |

| Observations | 494 | 494 | 494 |
| Groups       | 56  | 56  | 56  |

R-squared

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within</td>
<td>.04</td>
<td>.04</td>
<td>.04</td>
</tr>
<tr>
<td>Between</td>
<td>.19</td>
<td>.16</td>
<td>.28</td>
</tr>
<tr>
<td>Overall</td>
<td>.06</td>
<td>.06</td>
<td>.07</td>
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</table>

Note: * p≤0.05, ** p<0.01, *** p<0.001. Cluster robust standard errors in parentheses.