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**Measuring distributed leadership agency in a hospital context:
Development and validation of a new scale**

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Abstract

Purpose: The purpose of this study is to develop and validate an instrument that can measure Distributed Leadership as employees' active participation in distributed leadership tasks. We designate this as the Distributed Leadership Agency (DLA).

Methodology: Data were collected throughout all departments and occupational groups at a merged centralized hospital setting in Denmark. A total of 1774 employees from 24 hospital departments and 16 occupational groups completed our survey. SEM and CFAs were applied to identify appropriate items and a test for measurement invariance, predictive, discriminant and convergent validity, and ANOVAs were applied to analyze group differences in DLA.

Findings: The identified uni-dimensional questionnaire consists of seven items, as it is different from, but associated with, empowering leadership, organizational influence, attitude to participation and trust in management. As theoretically predicted, DLA is positively related to self-efficacy, job-satisfaction and innovative behaviour. Chief physicians, permanent employees and employee representatives scored higher on the scale than the rest of their respective counterparts.

Practice implications: The survey offers a method to assess a distribution of leadership agency in hospital organizations. Such assessment may provide a basis for organizational and leadership development, as well as future research in Distributed Leadership among hospital employees.

Originality/value: The present study provides a reliable and valid quantitative instrument that measures how much employees' at all hierarchical levels are involved in concrete leadership activities in the hospital context. Taking a normative perspective we could show that Distributed Leadership – measured with the DLA-questionnaire – has positive effects on employees' behaviour.

For decades, theoretical understandings of management and leadership have been delineated to individual activity, i.e. something a leader does or ought to do. Recently, this paradigmatic assumption has been challenged and denoted as a “romance of leadership” or “heroic leadership.” Furthermore, alternative perspectives have gained attention in the research field of management. One promising approach here is that of Distributed Leadership (DL) (as increased publications of research articles demonstrates, cf. Bolden, 2011). Though the concept of DL is contested, the widened perspective on leadership as *functions* that more if not even all organizational members can potentially exert is at the core of the concept of DL. By widening the perspective of leadership beyond that of the single person or a positional organizational role, a more complex image of how an organization is led by its incumbents is revealed (Gronn, 2002). The theoretical scope of being able to grasp such a complexity is an improved understanding of leadership mechanisms, which may aid organizational adaptation to complex tasks and demands (Bolden, 2011). In this respect, DL is in accordance with other post-bureaucratic management approaches. The potential benefits of higher degrees of DL include successful organizational change and improved organizational performance (e.g. student learning and personal growth at schools) (Harris, 2008), although the extant empirical studies are inconclusive with respect to these claims (Bolden, 2011). The majority of literature on DL stems from qualitative case studies of educational institutions, such as schools, universities, etc. Given their high degree of

complexity and general traditions for sharing leadership tasks (e.g. distributed between physicians, nurses, administrators), hospital organizations may even be more suitable contexts for examining and practicing DL (cf. case study within health care by Chreim et al., 2010), though Martin, Beech, MacIntosh & Bushfield (2015) have identified important challenges in such contexts.

The timeliness of the present study is underlined by a meta-analysis by Tian, Risku and Collin (2016). They conclude that the DL field lacks important research that focus on “leadership from the viewpoint of the individual as an agency” (p. 159). The present article aims to validate a scale that can measure exactly that: how individuals engage in distributed leadership agency. Another important reason for conducting the present study is grounded in the fact that quantitative research is needed to further the predominantly qualitative research of the extant literature. A necessary and requested step forward here is to develop sound measurement instruments that can assess the phenomenon of leadership among organizational members, notably for employees (Yammarino et al., 2012). Since such validated questionnaires are rarely available, the present study purports to develop and validate such an instrument. By applying an Activity Theory approach (acc. to Gronn, 2002) and Bandura’s (1997) Cognitive Theory of Agency, we respond to Mayrowetz’ (2008) call for the usefulness of Activity Theory in DL research. Gronn’s (2002) theoretical notions imply that in principle distributed leadership agency (DLA) can be exerted by all organizational members. The

more DL is dispersed within an organization, the more employees without formal leadership positions will be engaged in leadership tasks. Hence, we choose not to focus on formal leader positions, and instead aim to develop a scale that measures employees' agency in leadership. The properties of such a scale will help facilitate an investigation of different (sub)organizational patterns of DL (cf. Gronn's [2009] concept of leadership configurations), as well as aid in an understanding of the individual level of analysis. In other words: What does agency in DL tasks mean for the single employee? In this way, such a scale will have the potential to bridge the descriptive and normative approaches within the field of DL (Mayrowetz, 2008).

The concept of DLA

Gronn (2000) departs in part from Gibb's (1954) notion that leadership can be conceived as a group property, meaning that a group must perform a set of leadership functions in order to act efficiently as a group. Gronn (2002) widens the perspective of leadership to comprehend organizations as consisting of organizing processes of actions. In this view, organizational members that may, in principle, be dispersed all over the organization decide upon and perform actions that may be more or less related to their organizational practice. These "conjoint actions" are performed by organizational members, who are reciprocally dependent on each other due to complementary expertise (e.g. physicians and nurses) or overlapping roles and

responsibilities (e.g. nurses needing to assist each other). For example, when encountering a problem or identifying a potential for improvement, organizational members need to coordinate their responsive actions, including setting goals, thereby requiring necessary resources and mobilizing, synchronizing and monitoring efforts. In short, conjoint actions in all areas of an organization need to be led, and this notion is at the core of the concept of DL (Gronn, 2002). Social influence is a defining feature of leadership (Yukl et al, 2002), and Gronn (2000) subscribes to this view. With this notion, DL is the social influence inherent in conjoint activity within the organization. Since conjoint actions are required for all organizational members, leadership can be more or less distributed. Conjoint actions and their leadership can emerge out of a situation as spontaneous collaboration, they can be in the shape of intuitive working relations based on a continuous adaptation and knowledge about each other or they can be institutionalized in the form of formal or informal practices (Gronn, 2002). To sum up, the present study subscribes to a concept of DL as a form of leadership, in which leadership tasks and functions are distributed to employees. As such, leadership can be more or less focused or dispersed within an organization; DL is related to conjoint actions: it involves organizing relations at different levels and may occur between levels or within the same level. DL provides a dynamic view on leadership as emergent and planned distributed tasks, in which the realized distributed influence and decision-making may be governed by social interaction related to conjoint actions.

The focus on DL as an influence in conjoint actions (Gronn, 2000) implies that organizational members, who take an active part in DL act as agents within the organizational structure. Woods, Bennett, Harvey and Wise (2004) divide DL in agentic and structural DL, based on Archer's (2000) analytical dualism approach. Actions form structure and structure is a condition of action, and distributed leadership is here seen as people, who respond to, utilize and shape structural resources, culture and social relations in organizations. Bandura (1997) defines agency as "acts done intentionally" (p. 3). In this perspective, agency is to experience intention, to generate an action plan through forethought, to monitor and react as the plan is implemented in action and to initiate self-reflections about the forces stimulating the relative success and failure of the action. In Bandura's theory, self-efficacy, i.e. the beliefs about one's capacities to act efficiently, is a key cognition that is both an antecedent and a consequence of the process. Deci and Ryan (2000) conceive of agency in terms of self-determination, and emphasize autonomy for shaping one's own intentions and competence to fulfil them. Because agency fulfils the basic needs for autonomy and competence, motivation is either intrinsic or based on the agent's own values and goals. In this sense, Deci and Ryan's (2000) theory implies that agency is related to an active, sentient state of mind that may be described as psychologically engaged, committed or involved. From a psychological viewpoint, we argue that employees' and formal leaders' agency in DL is experienced as an active, engaged involvement in taking part in leadership activities. As

such, we suggest that a scale measuring DLA should tap into experiences of active involvement in different leadership tasks. Gronn (2000) touches upon the fundamental leadership question: What constitutes leadership activities and tasks? He applies Activity Theory to produce a template for analyzing leadership activity configurations, e.g. contextual factors or instruments, rather than designate the concept of leadership activities. Yukl et al. (2002) may come closer to an answer regarding the question about what leaders do. They conclude with three metacategories of leadership behavior: 1) Change-oriented-, 2) Task-oriented-, and 3) Relation-oriented behaviour. This broad nomenclature may encompass a variety of leadership behaviour, and constitutes three broad dimensions of leadership tasks.

Based on the aforementioned theories, we aim to develop a scale that measures the degree to which organizational member experience being actively involved in leadership activities within organizational change, managing tasks and strengthening social relations at work. Unfortunately, the few extant scales fail to meet this end.

Existing DL scales

An intensive and thorough literature search revealed that only a few measures of DL exist. In line with the activity approach (Gronn, 2000; Spillane, et al. 2004), we searched for instruments that survey the distribution of employees' active participation in leadership tasks. Leithwood et al. (2007) measured their 2x2 model of DL. The four

DL patterns were operationalized with a single item tapping into whether a school organization is characterized by DL in the shapes of a planful or spontaneous alignment, or a spontaneous or anarchic misalignment. Neither scale focused on leadership tasks and activities nor on any agentic involvement in these. This is in discord with Mayrowetz's (2008) recommendations to investigate DL on an Activity Theory basis, while Heck and Hallinger (2010) did consider an activity approach, as they applied existing items *post-hoc* from an already existing state survey. The items asked to what extent the school leadership improved by empowering students and staff, and complied with school governance and resource management and development. These school leadership tasks were specific to schools, and therefore not applicable to hospitals or other organizational contexts. Hulpia et al. (2009) provide a DL measure based on three dimensions: 1) quality and distribution of leadership functions within the leadership team, 2) cooperation within the leadership team, and 3) a participative school decision-making by teachers. The first dimension includes an agentic perspective by asking for the distribution of two leadership functions: supportive and supervisory leadership functions. However, we assume that leadership tasks comprehend more than these two functions, and by only asking for the distribution within the leadership team, emergent bottom-up leadership forms are not considered. Thus, reviewing the few extant scales that measure DL, it is our conviction that they lack theoretical validity in terms of specific leadership activities and an agentic perspective, as implied by Bandura and the

Activity Theory basis for our concept of DL. Moreover, reliability can be compromised in the use of scales applying single items.

Item generation process of DLA

Yukl et al.'s (2002) three meta-categories of leadership behaviour (change-, task-, and relation-oriented behaviour) build the theoretical framework of the DLA-questionnaire development. Each category includes specific behaviour components that must be observable by others and has to be potentially applicable to all types of leaders within an organization. Not all behaviour components described by Yukl and colleagues (2002) were appropriate for the DL concept, e.g. the component "provide recognition for achievements and contributions". Such recognition behaviour is often given along with tangible rewards, but informal leaders according to the DL concept do not have the resources for giving tangible rewards. Additionally, prior to item formulation we conducted informal interviews with several different employees and analysed work and department descriptions in the hospital where the questionnaire should be applied. This helped us in adapting Yukl and colleagues' (2002) behavioural components to the specific context. Finally, we formulated in an expert team based on the metacategories (Yukl et al., 2002) and on the qualitative information from the hospital three items that refer to the change-behaviour, three items referring to the task-behaviour and four items

depicting the relation-behaviour. Table 1 shows all ten items and their initial factor loadings.

Table 1. Items, intercorrelations, and factor loadings of initial and final DLA-version within a CFA.

	Item	<i>r</i> between dimensions	Factor loadings
Overall sample (N = 1774) initial 10 items – three dimensions			
Change dimension			
1.	Have you participated in setting goals for the development of your unit?		.71
2.	Have you actively contributed to change processes at your unit?		.83
4.	Have you contributed in promoting proposals about the operation and development of your unit?		.85
Task dimension			
3.	Have you been active in working with coordination of the different functions of your unit?		.85
5.	Have you had the responsibility for organizing work tasks at your unit?		.76
7.	Have you been involved in managing how the resources are distributed at your unit?		.72
Relation dimension			
6.	Have you been engaged in activities that involve your colleagues in decision-making about operations and development of your unit?		.86
8.	Have you participated in organizing activities about the development of competencies for your colleagues?		.68
9.	Have you taken part in solving conflicts among the staff at your unit?		.59
10.	Have you worked purposefully with motivating your colleagues to participate in leadership activities at your unit?		.63
	Change – task	.979	
	Change – relation	.906	
	Relation – task	.946	
	Modelfit: $\chi^2 = 583.90$, $df = 32$, $p < .001$, CFI = .929, TLI = .900, RMSEA = .099		
Subsample 2 (n = 916) final seven items – one dimension			
1.	Have you participated in setting goals for the development of your unit?		.66
4.	Have you contributed in promoting proposals about the operation and development of your unit?		.79
5.	Have you had the responsibility for organizing work tasks at your unit?		.76
7.	Have you been involved in managing how the resources are distributed at your unit?		.72
6.	Have you been engaged in activities that involve your colleagues in decision-making about operations and development of your unit?		.86

- | | | |
|----|---|-----|
| 8. | Have you participated in organizing activities about the development of competencies for your colleagues? | .66 |
| 9. | Have you taken part in solving conflicts among the staff at your unit? | .53 |

Model fit: $\chi^2 = 47.26$, $df = 14$, $p < .001$, CFI = .984, TLI = .975, RMSEA = .051

Note: Standardized factor loadings are reported. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = root mean square error of approximation

Constructs theoretically related to, but different from DLA

DL differs from, but is related to, other constructs associated with low, hierarchical or flat, organic organizational forms. Empowering leadership is the behaviour of a formal leader characterized by a downward delegation of responsibility and decision-making authority over work tasks. This delegation is supported by a motivational approach that enhances the meaningfulness of work, experiences of competence, autonomy and impact on the department's results. This leadership style aims to increase feelings of self-efficacy and control by motivating the employee, granting freedom and supporting autonomy, removing bureaucratic constraints, in addition to interacting about the purpose and meaningfulness of the job tasks (Ahearne et al., 2005). Empowering leadership differs from DL in that it refers to a formal leader's behaviour and not to how leadership tasks are distributed. Moreover, there is a focus on organizing and executing the job, rather than simply assuming a higher level of organizational responsibility, which may be the case for DL. However, the delegation of freedom and authority within empowering leadership may encourage employees' active involvement in non-

leadership job tasks, as well as in leadership tasks. Hence, we suggest that empowering leadership is different from, but positively related to, DLA.

A weighty construct in a participation in decision-making theory is influence sharing. Heller (2003) suggests that power and influence are key ingredients in producing effects of employee participation. DL may most likely involve achieving more organizational influence, as organizing conjoint actions in organizations may necessitate the use of influence to a certain extent. However, we argue that taking part in leadership tasks is a different and behavioural phenomenon. Influence may better be perceived as a capacity to shape actions, whereas DLA is using more or less influence to perform certain tasks related to different conjoint actions. Influence may also be based on democratic and participative practices such as a codetermination in making decisions (Heller, 2003), while also being connected to leadership initiatives. We argue that organizational influence is indeed positively related to, yet not identical, with DL.

Some attitudinal constructs can be related to DLA. According to the Theory of Planned Behavior (Ajzen, 1991), people will be more likely to act (here: undertake leadership tasks) if they are positive towards the behaviour of DL, and if there is a subjective norm that supports the behaviour. We believe that two such attitudes that may stimulate more DLA are trust and positive attitudes to employee participation. In turn, we believe that experiences with DLA will provide feedback on a person's attitudes, which forms a spiral model of the processes. Trust is a willingness to be

vulnerable to someone else because of expectations for that person to have benevolent intentions or behaviour (Rousseau et al, 1998). Trustworthy persons are benevolent, able and have integrity (Mayer, Davis and Schoorman's (1995) – they are honest and use their competences for the best for everyone. Having a willingness and the courage to undertake leadership tasks may depend upon trusting that one's manager does not punish one for failing to accomplish the task, and that the manager will support one's effort in such an extra-role behaviour as DL. Another relevant attitude is "positive attitudes to employee participation." To be willing to initiate an active involvement in leadership tasks may require both a belief in the value of employee participation and a successful agency that will reinforce such a positive stance towards it. In sum, both constructs may be antecedents for- and consequences of participating in leadership activities. We therefore suggest that trust and positive attitudes to involvement are positively associated with DLA.

Effects/outcomes of DLA

Occupational self-efficacy (Schyns and von Collani, 2002) refers to an employees' perceived competence concerning his/her ability to successfully accomplish different tasks in his/her job. Self-efficacy is primarily grounded on a self-perception of competence (Bandura, 1997). As perceived self-efficacy, it strongly refers to personal action control. According to Bandura (1997), self-efficacy is the vital cognitive belief

for agency, with personal mastery experiences having the most power for developing self-efficacy. Conger and Kanungo (1988) suggested that sharing organizational resources with employees and giving them real power through the use of participative management techniques helps foster the development of self-efficacy at work. DLA as such a management initiative may enhance employees' opportunities to participate in decision-making and increase their responsibility in the job, and in this way employees can test their efficacy (Conger and Kanungo, 1988). Successfully performing leadership tasks will lead to those enactive mastery experiences that are most crucial in the development of self-efficacy.

Taking active part in leadership tasks can also be perceived as a job enrichment (i.e. higher responsibility) and job enlargement (i.e. more variation of job tasks). Meta-analytic evidence suggests that these dimensions are positively related to job satisfaction (Fried, 1991), with another possible outcome of DLA being innovative behaviour. When different people take the lead within various leadership areas, different solutions may be likely the result. In turn, this diversity in solutions may result in new and better ways of organizing and performing organizational functions. Some DL researchers have been preoccupied with the potential to improve organizational functioning, most notably within the school sector (Mayrowetz, 2008). Consequently, we propose that DLA is positively related to job satisfaction and innovation.

Methods

Sample and procedure

The studied public hospital organization was geographically dispersed as a result of a recent merger. It is located at four different sites in Denmark, with an overall size of approximately 4600 employees. The four sites consist of a main hospital, a hospital specializing in neuro-rehabilitation, a hospital specializing in surgery and acute treatment and a smaller hospital with various functions. The hospital is led by a troika leadership consisting of an (administrative) director, a chief physician and a chief nurse. The 26 departments are led by a group of head nurses and head physicians working in tandem. Public hospitals are the cornerstone of health-care organizations in Denmark, and the hospital is fairly representative of a Danish centralized regional hospital setting.

We applied an online survey, and sent 4575 employees an invitation and link via their e-mail addresses. Paper-pencil versions were distributed to those (n=314) who did not have access to a computer (primarily some cleaning and kitchen staff), and we assured the participants complete confidentiality and anonymity in the reports of results. We subsequently learned that 199 employees were on long-term leave (notably maternal leave), which this left us with 4376 potential respondents. A total of 2217 returned the questionnaires, with a further data cleaning (a deletion of respondents who did not reply on the full scales and a deletion of higher-ranking middle and top managers, who by definition took part in leadership and is therefore not of interest here) resulting in 1774

useful responses that were applied in the further analyses (response rate = 40.5%). Table 2 and Table 3 show the demographic characteristics of our sample.

Table 2. Descriptive statistics of DLA for group comparisons.

	<i>n</i>	<i>M</i>	<i>SD</i>
Department			
1. Administration	88	2.15	0.75
2. Anaesthesia and Surgery	170	2.14	0.91
3. Radiology	47	1.85	0.72
4. Children	72	2.22	0.86
5. Planned surgery centre	177	2.20	0.88
6. Diagnostic centre	92	2.24	1.00
7. Physio- and Ergo therapy	64	2.28	0.75
8. Surgical department	71	2.17	0.91
9. Women's department	91	2.17	0.85
10. Medical department	155	2.22	0.91
11. Neurological department	75	2.11	0.84
12. Orthopaedic department	110	2.02	0.81
13. Neuro centre H	223	2.24	0.88
14. Clinical biochemical department	81	1.71	0.74
15. Support and technical unit	81	1.97	0.91
16. Several small units (e.g. hospital pharmacy, pathology, urology)	99	2.13	0.96
17. Others	69	2.05	0.83
Occupational groups/professions			
1. Nurses	664	2.26	0.88
2. Service, cleaning employees, assistant, kitchen staff, hospital porter	129	1.77	0.76
3. Social and health assistant	110	1.97	0.67
4. Medical secretary	188	1.74	0.69
5. Radiographer, Bioanalyst	122	1.82	0.82
6. Young doctors	83	1.69	0.69
7. Chief doctors	90	3.02	0.93
8. Physio/Ergo therapists, Midwives	184	2.26	0.78
9. Administrative and technical staff	116	2.13	0.84
10. Others	76	2.37	0.88
Permanent position			
0 No	155	1.59	0.67
1 Yes	1618	2.18	0.87
Representative function			
0 No	1445	2.05	0.85
1 Yes	310	2.54	0.90

Table 3. Means, standard deviations, zero-order correlations and average variance extracted analysis.

	1	2	3	4	5	6	7	8	9	10	11	AVE	AVE square root
1. Gender													
2. Age	-.04												
3. Tenure in unit	.04	.48**											
4. DLA	-.08**	.18**	.15**									.54	.74
5. Empowering leadership	.04	-.02	.04	.43**								.69	.83
6. Influence on the organization	-.04	.04	.09**	.52**	.53**							.51	.71
7. Trust in section management	.01	-.01	.00	.24**	.58**	.39**						.83	.91-
8. Attitude to involvement	.02	.15**	.12**	.12**	.05*	.05*	.02					.75	.87
9. Occupational self-efficacy	-.04	.04	.04	.19**	.31**	.22**	.18**	.10**				.52	.72
10. Innovation	-.09**	.09**	.02	.50**	.30**	.29**	.19**	.12**	.26**			.83	.91
11. Job satisfaction	.03	.02	.06*	.15**	.47**	.34**	.45**	-.06*	.29**	.19**		-	-
<i>M</i>	1.88	44.42	7.37	2.13	3.48	2.26	3.90	4.35	3.98	3.40	4.14		
<i>SD</i>	0.33	10.29	7.53	0.87	0.66	0.81	0.94	0.65	0.51	0.64	0.84		

Note. *N* varies between 1503 and 1773 due to missing values. Gender: 1 = male, 2 = female. AVE = average variance extracted. * $p < .05$, ** $p < .01$.

Measures

Employees answered all measures on a 5-point scale, ranging from 1 (*strongly disagree*) or (*none*) to 5 (*strongly agree*) or (*very much*). Table 4 shows the internal consistencies and confirmatory factor analyses (CFA) of all scales.

Empowering leadership. We used the 12-item measure from Ahearne and colleagues (2005), which captures empowering leadership with four dimensions: (a) enhancing the meaningfulness of work, (b) fostering participation in decision-making, (c) expressing confidence in high performance, and (d) providing autonomy from bureaucratic constraints. A sample item is: “My manager believes that I can handle demanding tasks.”

Trust in management. Trust in management was measured for the immediate leader of the ward section by the single item used in Morgan and Zeffane (2003): “Management at this workplace can be trusted to tell things the way they are.” This item tapped into trustworthiness in the form of honesty (cf. the integrity dimension in Mayer et al.’s (1995) classic model of trust), and we added a supplementary item to tap into trustworthiness as acting with the best intention and ability: “I trust that management at my ward section does the best that it can.” The latter item hence intends to tap into the

Table 4. Number of participants, dimensions, items, internal consistencies (α) and CFA of scales.

Note: For influence on organization and occupational self-efficacy, residual correlations were added on. Tests of model fit cannot be calculated for latent variables with three manifest variables because the models are exactly identified. CFI = Comparative Fit Index; TLI = Tucker-Lewis

Scale	<i>N</i>	Dimensions	Items	α	χ^2	<i>df</i>	<i>p</i>	RMSEA	CFI	TLI
Distributed Leadership Agency (final version)	1773	1	7	.89	78.36	14	< .001	.051	.985	.977
Empowering leadership	1712	4	12	.92	366.73	50	< .001	.061	.962	.950
Influence on organization	1766	1	4	.83	0.34	1	.559	.000	1.000	1.002
Trust in section management	1520	1	2	.91	-	-	-	-	-	-
Attitude to influence	1611	1	3	.90	-	-	-	-	-	-
Occupational self-efficacy	1770	1	8	.90	142.59	19	< .001	.061	.971	.957
Innovation	1529	3	9	.93	291.25	24	< .001	.085	.957	.936
Job satisfaction	1550	1	1	-	-	-	-	-	-	-

Index; RMSEA = root mean square error of approximation

two remaining trust dimensions by Mayer et al.: 'To do one's best' pertains to use one's abilities fully and with the best intentions. Hence, the idiomatic statement in this context touch upon both the 'ability' and 'benevolence' dimensions of trustworthiness.

Influence on the organization. We measured the experiencing of organizational influence by using the items from Jeppesen et al. (2011). A sample item is: "How much influence do you experience that you have on the financial decision-making by the organization?"

Attitude to involvement. This scale measures three aspects of attitude to employee participation that are beneficial for the employees' well-being, the leader-employee cooperation and productivity. The items are: 1 - "Involvement in the organization's decision-making is important for the employees' well-being," 2 - "The productivity of the organization is improved if the employees are involved on the organization's decision-making," and 3 - "Involvement of the employees in the organization's decision-making results in better co-operation."

Occupational self-efficacy. We measured occupational self-efficacy with the validated eight-item version from Schyns and von Collani (2002), which is specific to the work domain and assesses employees' own confidence to successfully fulfil a job or cope with problems at work. A sample item is: "When I am confronted with a problem in my job, I can usually find several solutions."

Innovation. For rating innovation, we used Janssen's (2001) nine-item measure for individual innovative behaviour in the workplace and adapted it to the Danish language. This instrument captures three dimensions of employees' self-rating: a) idea generation, b) idea promotion and c) idea realization. A sample item is: "I'm creating new ideas for improvements."

Job satisfaction. Job satisfaction was measured with one overall item: "How satisfied are you overall in your current job?" Wanous and Reichers (1996) estimated that single items of job satisfaction were reliable as they tended to correlate .70 with full scales.

Analytical approach

We computed all statistical analyses with IBM SPSS Statistics 21 and Mplus version 7.11, with the CFAs and the structural equation model (SEM) using a robust maximum likelihood (MLR) estimation. Our validation process was conducted in eight steps: a) a CFA of the theoretically derived DLA measurement model, b) splitting the original sample into two random halves, c) exploratory analyses on the first subsample by conducting CFAs and using modification indices, d) cross-validating the exploratory model solution in the CFA on the second random subsample, e) testing measurement invariance across the two random samples and different groups of interest, f) testing for group differences with ANOVA and Welch tests, g) providing evidence for convergent and divergent validity by computing pairwise CFAs on DLA, with the correlates empowering leadership, organizational influence, attitude to participation and trust in section leadership, as well as by comparing the square root of DLA's average variance extracted (AVE) with the manifest bivariate correlations of the four correlates, and h) finally testing the predictive criterion validity of DLA relative to occupational self-efficacy, job satisfaction and innovation with SEM.

Findings

Analysis of the theoretically derived DLA model

First, we computed with the overall sample ($N = 1774$) the means, standard deviations and internal reliabilities on the three theoretical (change, task and relation) dimensions. The means ranged from 1.93 to 2.42, which to some degree indicates differences between the three DLA dimensions. The standard deviations varied between 0.85 and 1.02, thereby pointing to a moderate variability in the ratings, with the Cronbach alphas ranging between .80 and .84. The upper part of Table 1 shows that the CFA of the three-factor model achieved poor fit indices, satisfactory factor loadings ($> .59$), but high factor intercorrelations ($> .91$), so that we failed to provide evidence for a discriminant validity of the theoretical three-factor model, and had to combine the three dimensions into one overall factor.

Refinement and reanalysis of the DLA measurement

In a next step, we randomly split the original sample into two groups, creating a sample for exploratory analyses ($n = 858$) and a cross-validation sample for confirming the new measurement model with CFA ($n = 916$).

Within the exploratory analyses, we conducted a CFA with the 10 items loading on a single factor. The model fit was poor ($\chi^2 = 375.09$, $df = 35$, $p < .001$, CFI = .917, TLI = .894, RMSEA = .106) and quite similar to the original three-factor model. We therefore examined the modification indices for residual correlations. Since items 2, 3, and 10 exhibited markedly high error correlations with several other items, we deleted them and ran again a one-factor CFA with seven

items. The seven-item solution provided a good model fit ($\chi^2 = 51.28$, $df = 14$, $p < .001$, CFI = .984, TLI = .975, RMSEA = .056), with a significant factor loadings of all items, ranging between .58 and .89.

For cross-validation we conducted a CFA (lower part of Table 1) with the second random sample ($n = 916$), and were able to confirm the one-factor structure for the seven items. The model fit was good as well ($\chi^2 = 47.26$, $df = 14$, $p < .001$, CFI = .984, TLI = .975, RMSEA = .051), and the factor loadings of all items were significant, ranging between .53 and .86.

In a further step, we conducted five multigroup analyses to provide evidence that the one-factor model of DLA was psychometrically equivalent across different groups of interest. We followed the recommendations of Vandenberg and Lance (2000) in the sequence of testing nested models for measurement invariance. First, we computed an unconstrained baseline model (configural invariance) to show that the different groups conceptualize DLA in the same way. Second, we constrained the factor loadings to test their similarity between groups (metric invariance), and third, we tested whether the items intercepts were invariant (scalar invariance) for those group comparisons where we did not expect differences in the means of DLA. Consequently, we analysed the two random subsamples for configural, metric and scalar invariance. We assumed differences in the level of DLA with respect to four multi-group analyses: departments, professions, employees with and without a permanent position, and employees with and without a

representative function; therefore, we only compared configural and metric invariance. We evaluated the change in CFI within the nested models for proving measurement invariance. According to Vandenberg and Lance (2000), changes in CFI of .01 or less indicate measurement invariance across groups. Table 5 shows that all multi-group comparisons confirmed the psychometric equivalence of DLA across the analysed groups.

Table 5. Multigroup analysis of random subsamples, departments, occupation, permanent position and representative function in DLA.

Model	χ^2	<i>df</i>	<i>p</i>	CFI	RMSEA	Model comparison	$\Delta\chi^2$	Δdf	<i>p</i>	ΔCFI
Random subsamples										
1. Configural invariance	98.50	28	< .001	.984	.053	Model 2. ↔ 1.	7.52	6	.275	
2. Invariance of the factor loadings	109.12	34	< .001	.983	.050	Model 3. ↔ 1.	26.16	12	.010	- .001
3. Invariance of the item intercepts	127.72	40	< .001	.980	.050	Model 3. ↔ 2.	18.46	6	.005	- .004
Departments										
1. Configural invariance	379.31	238	< .001	.970	.076					
2. Invariance of the factor loadings	522.50	334	< .001	.960	.074	Model 2. ↔ 1.	142.23	96	.002	- .010
Occupation groups										
1. Configural invariance	280.74	140	< .001	.965	.076					
2. Invariance of the factor loadings	373.17	194	< .001	.956	.072	Model 2. ↔ 1.	91.30	54	.001	- .009
Permanent position (yes/no)										
1. Configural invariance	91.31	28	< .001	.983	.051					
2. Invariance of the factor loadings	108.46	34	< .001	.980	.050	Model 2. ↔ 1.	16.89	6	.001	- .003
Representative function (yes/no)										
1. Configural invariance	105.85	28	< .001	.982	.056					
2. Invariance of the factor loadings	120.48	34	< .001	.980	.054	Model 2. ↔ 1.	305.93	54	.010	- .002

Note: *N* varies between 1749 and 1773 depending on missing values; *CFI* refers to the comparative fit index, *RMSEA* to the root mean square error of approximation

Group differences in DLA

We assumed that not all employees in a hospital have the same possibilities for participating in leadership tasks, as DLA may differ between departments, between different occupational groups, between employees with and without a representative function in the company and between employees possessing a permanent versus a temporary contract. Taking a first look at the means in Table 2, the 17 department groups varied in their level of DLA between 1.71 (clinical biochemical department) and 2.28 (physio- and ergo therapy). A conducted ANOVA showed that the effect of the department on DLA was small but significant, $F(16, 1748) = 2.52, p = .001, \eta_p^2 = .02$. Games-Howell post-hoc tests clarified that only the clinical biochemical department significantly differed from other departments (administration, anaesthesia and surgery, children, planned surgery centre, diagnostic centre, physio- and ergo therapy, women's department, medical department and neuro centre). Nonetheless, they did not differ from the radiology, or from the surgical, neurological and orthopaedic departments, as well as from the support-, technical- and other small units that were summarized in one group. No other pairwise tests were significant, whereas between the occupational groups the variation of DLA was much bigger. The means (Table 2) ranged between 1.69 (young doctors) and 3.02 (chief doctors). Additionally, the computed ANOVA

resulted in a significant medium to large effect of the professions on DLA, $F(9, 1752) = 27.47, p < .001, \eta_p^2 = .12$. Games-Howell post-hoc tests yielded many pairwise significant comparisons, though for reasons of space constraints we did not report all the significant results. Most obvious is that the chief doctor's level of DLA is significantly higher than those of all other occupational groups. Nurses, physio/ergo therapists, midwives and the group of others had significantly higher levels of DLA than young doctors, service workers, the cleaning staff, assistants, the kitchen staff, the hospital porter, the medical secretary, the social and health assistant, as well as the radiographer and bioanalyst. And lastly, the administrative and technical staff reported significantly higher DLA values than the young doctors, service workers, the cleaning staff, assistants, the kitchen staff, the hospital porter and the medical secretary. With respect to the comparison of permanent to nonpermanent employed hospital staff, a conducted Welch test showed that permanent employees had significantly higher DLA values than nonpermanent employees, $t(207.77) = -10.31, p < .001$. This difference represented a medium to large effect, $d = 0.76$, while the effect of the representative function in the job on DLA was significant as well, $t(434.94) = -8.90, p < .001$. With a medium effect ($d = 0.56$), the Welch test showed that employees with a representative function were significantly more participating in leadership tasks than employees without a representative function. The conducted difference testings provide evidence

that our DLA measurement was able to differentiate within a hospital between different groups, although the differences between the departments were very small.

Convergent and discriminant validity of DLA correlates

We assessed the convergent and discriminant validity of DLA with empowering leadership, organizational influence, trust in section leadership and attitude toward involvement. To this purpose, we conducted pairwise CFAs of DLA with each correlate, in which all items loaded on the proposed factor let the two latent constructs correlate freely. These were subsequently compared with corresponding CFAs, in which the correlations between the latent variables were constrained to be 1. Proving that the chi-square value of the unconstrained model is significantly lower than the chi-square for the constrained model indicates that the constructs are not perfectly correlated, and provides evidence for discriminant validity (Venkatraman, 1989). Conducted chi-square difference tests, as well as Wald tests, showed that the model comparisons of all paired CFAs were significantly better for the unconstrained- than constrained model.¹ Table 3 shows that the square root of the DLA's average extracted variance exceeded the zero-order correlations between DLA and empowering leadership, influence on the organization and trust in section management, which also indicates discriminant validity (Gefen and Straub, 2005). The correlations were substantial and significant (Table 3),

¹ The results of the tests can be requested from the first author.

providing enough simultaneously convergent validity. The correlation between DLA and attitude to involvement was small ($r = .12, p < .001$), thus suggesting that the attitude to involvement measurement really surveys employees' attitudes and that DLA measures employees' concrete behaviour, hence indicating additional discriminant validity.

Predictive criterion validity of DLA

The final step of our validation study comprises the assessment of the predictive value of DLA on the outcome variables of occupational self-efficacy, innovation and job satisfaction. Figure 1 shows the conducted SEM which accounts for measurement error and tests a causal relation that considers the three outcome variables simultaneously in one regression. The resulting model fit was good ($\chi^2 = 1,082.02, df = 266, p < .001, CFI = .958, TLI = .953, RMSEA = .042$), and the results reveal that DLA positively predicted occupational self-efficacy ($\beta = .21, p < .001$), innovativeness ($\beta = .54, p < .001$) and job satisfaction ($\beta = .16, p < .001$).

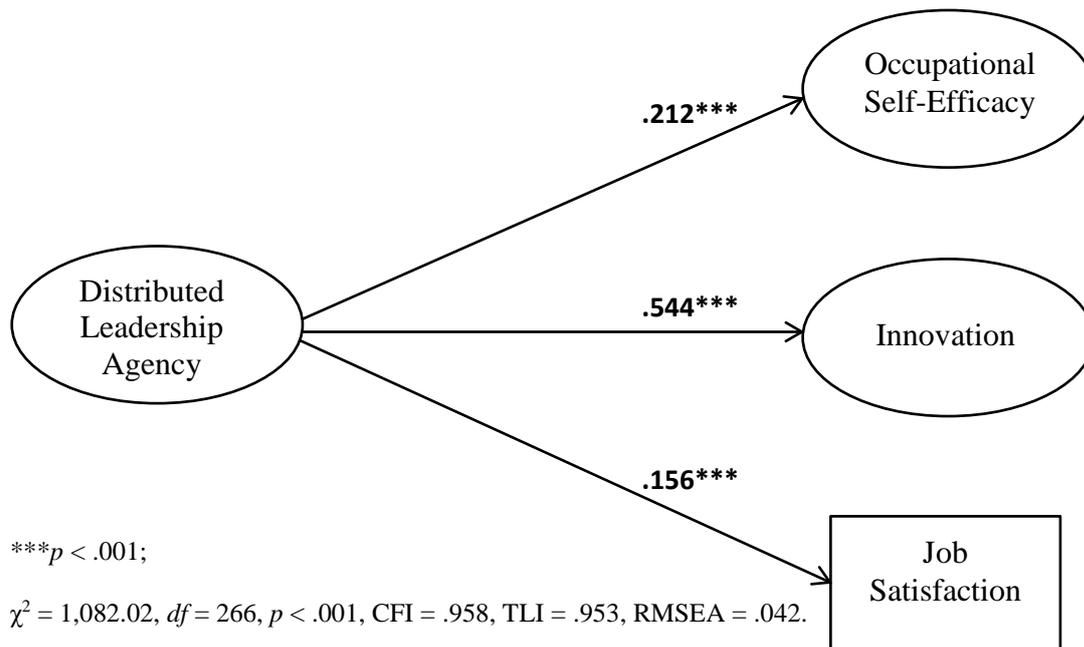


Figure 1. Results of Structural Equation Modelling for DLA’s predictive validity.

Discussion

The results of the present study show that the newly developed questionnaire – DLA – captures employees’ active participation in leadership tasks. Theoretically the seven items were derived from Yukl et al’s (2002) three meta-categories of leadership behaviour. The three-factorial structure of the measure was empirically not supported, as the three dimensions were too strongly related to each other. As such the results reveal a unidimensional measure with good model fits and high internal consistency. This one-factor DLA scale was psychometrically equivalent across different groups with respect to its unidimensionality and factor loadings. The differences in DLA between occupational groups tend to confirm the scale, most notably because the head doctors had the highest score on the scale. Furthermore, as expected, employees in a

permanent position scored higher than those in a temporary job, while employee representatives also scored higher than non-representatives. The study also demonstrated that the phenomenon measured by the unidimensional DLA scale is associated with similar but distinct constructs, i.e. the scale shows a discriminant and convergent validity *vis-a-vis* empowering leadership, organizational influence, trust in management and attitude to participation. In accordance with theoretical predictions, we found positive relationships between the scale and occupational self-efficacy, innovation and job satisfaction. In sum, we validated a scale that measures employees' DLA.

The present study contributes to the DL-literature in several ways. Firstly, the DLA-measurement is the first questionnaire that directly asks employees – and not leaders – about their active participation in concrete leadership tasks. As such, it takes an agentic approach that the very few existing quantitative measures on DL did not consider (cf. Leithwood et al., 2007). Additionally, the items of DLA are formulated for the hospital context, but the wording is general enough to be applied also in other organizational settings. This was problematic with quantitative DL measures that applied in some way an agentic perspective but were very specific for the school-context (e.g. Heck and Hallinger, 2010; Hulpia et al., 2009). Secondly, the present study could provide evidence that DLA is related but also distinct to other leadership concepts like empowering leadership or organizational influence. In this sense, this construct

enriches the leadership literature and is not only a new term for already existing, well proven concepts. Thirdly, we could show that the attitudinal constructs trust in management and attitude to involvement were positively but only weakly related to DLA. Attitudes are known to influence individual's actual behaviour (Ajzen, 1991) and therefore we assumed a positive attitude towards participation to be an important precondition that employees take over leadership tasks. Simultaneously, it was crucial to demonstrate that the newly developed DLA-questionnaire measures employees' behaviour and is not merely an attitude towards distributing leadership tasks within an organization. The weak positive relation with attitude to involvement confirms the behavioural focus of DLA.

Finally, the fourth convincing contribution of the present study is its combination of an agentic with a normative approach. Mayrowetz (2008) claimed that researchers do not use an activity theory approach if they study the effects of DL. We respond to this claim and were able to show that employees' active participation in leadership tasks – measured with the DLA – had positive effects on employees' occupational self-efficacy, job satisfaction and innovative behaviour. Several researchers (e.g. D'Innocenzo et al., 2014; Katz and Kahn, 1978; Mayrowetz, 2008; Wang et al., 2014) recognized the beneficial effects of DL by assuming that distributing leadership tasks to many employees increases the organization's effectiveness. Through information- and knowledge sharing employees improve their mutual communication,

through taking over leadership tasks employees can acquire broader skills and competences and the combination of these characteristics should lead to better performance. Empirically, Axtell and Parker (2003) found in a two-wave study that employees' active involvement in improvement activities lead to higher self-efficacy. Hulpia et al. (2009) confirmed a weak positive relation between DL and teachers' job satisfaction. As such, the results of our study are fully in line with the findings of the few prior empirical studies and confirm the positive effect of DLA among hospital employees.

With respect to practitioners' interests the scale may be useful for hospital organizations that include DL in their HRM strategy (Ford, 2005), as hospital administrations now have an opportunity to measure the degree and distribution of DLA. Assessing an organization using this instrument may provide hospital leaders with a diagnostic tool for both Organizational Development and leadership training programs. Though we recognize theoretical and practical potentials of DL, we do not claim that DL is a panacea for hospital organizations (in line with Heller, 2003). Martin et al. (2015) reported a large qualitative study that identified conflicts between groups in terms of power, perceived distance, and values (clinical vs. managerial) to misalign and disempower distributed leadership agents. We also do not claim to have identified all possible leadership areas that can be distributed, and the scale may be subject to further

development to meet local demands. In such a case, the scale is illustrative as a method for formulating items to measure agency in new leadership areas.

Limitations and future research

DL is conceptually contested and we therefore made choices within this variegated conceptual landscape. Consequently, the present scale has both theoretical strengths and weaknesses in that it has a focus. If the agentic approach is preferred (as recommended based on a meta-analysis by Tian et al., 2016) we believe that the present scale is a strong measurement tool. However, the scale may be of less value for structural DL approaches. Other dimensions within the DL approach, such as organizational alignment and planned vs. emergent (cf. Leithwood et al., 2007) and Gronn's (2002) different forms are not assessed in the present study. Hence, we believe that the present scale can measure an important aspect, and other theoretical notions of interest within the DL theoretical field could be supplement the present scale.

There may be contextual limitations to a generalization of the results about the measurement instrument. This is due to the fact that even though we used one large, centralized general hospital setting with a large variety of different departments, occupational groups and functions, hospitals in other national or cultural contexts may be structured differently. The national context of the present study is one in which culture (e.g. Power Distance) and labour market traditions incorporate and value

participative and democratic values. This condition may help to enhance the distribution and degree of employee agency in leadership tasks, which may also possibly accelerate the relationships with positive outcomes such as self-efficacy and trust in management. A limitation of the particular result about trust is that the measurement here uses only two items, and further research into DL and trust may apply longer validated trust scales. The items identified as being useful in the present study may also be specific to the present hospital organization, so we will hence advise further research to consider whether further areas of leadership (especially connected to Yukl et al's [2002] three meta-categories) may be distributed to employees in the actual context of future studies. A broader inclusion of areas in further instrument development may also potentially fit better with a three dimensional structure.

Though it is a strength that the scale makes it possible to measure employees' own experiences of participating in DLA, because it makes analyses of relationships with other subjective experiences and attitudes possible, this is also a limitation because a person's experience of such participation in leadership tasks may be biased compared to the actual participation in leadership tasks. In this way, the method may be subject to common method bias. However, the effect size of the correlation between attitude to involvement was rather low ($r = .12$), and attitude would likely be the most predominant source of bias compared to the other variables. As a result, we believe that the effect of common method bias should be rather small if any. The present study is designed cross-

sectionally, and future studies could overcome this limitation to inferring causality by applying a longitudinal or more comparative or experimental research design. We believe that future research on employees' perspectives on-, as well as antecedents to- and consequences of DL, may benefit from applying the current validated scale.

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