

Knowledge Sharing and Innovative Work Behaviour in Healthcare: A Micro-Level Investigation of Direct and Indirect Effects

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Introduction

Companies that stimulate knowledge sharing within and outside the organizational boundaries are more likely to develop innovations and improve their performance (Howell & Annansingh, 2013; Liu & Phillips, 2011; Zhou & Li, 2012). As work processes become ever more interdependent, individuals, teams and organizations need to systematically break through 'knowledge silos' and recombine a variety of skills and knowledge assets to continuously innovate processes and practices (Spencer, 2003; Tsai, 2001; Wang & Noe, 2010). Knowledge sharing is a fundamental mechanism for making such collaborative flows effective, allowing innovators to acquire new information and stimuli

for exploring external ideas and exploiting internal knowledge.

Past research has extensively investigated the impact of employees' knowledge sharing on the innovative capacity of the recipients of the knowledge; for example, *colleagues* (Majchrzak, Cooper & Neece, 2004), *teams* (Kessel, Kratzer & Schultz, 2012; Liu & Phillips, 2011), or *firms* (Lin, 2007; MacCurtain et al., 2010). Although those findings remain valid, one aspect previous work has rarely explored is whether knowledge sharing might also directly affect the transmitters of the knowledge, i.e., whether those who share knowledge more frequently are also more innovation-prone (Aulawi et al., 2009; Lu, Lin & Leung, 2012; Mura et al., 2013). In the literature, the potential link between employees'

knowledge sharing and their own innovative behaviours remains both under-theorized and empirically untested.

This study addresses this gap by investigating two mechanisms through which knowledge sharing might support employees' own innovative behaviours: (i) an indirect mechanism whereby the recipients of the knowledge reciprocate, and in their turn share other knowledge that stimulates innovative ideas; (ii) a direct mechanism whereby the very act of elaborating, combining and explaining knowledge to others stimulates the knowledge sharer to innovate.

We also test whether contingencies that drive knowledge sharing also elicit innovative behaviours. Our model adopts the motivation-opportunity-ability (MOA) framework to explain the antecedents of knowledge sharing at the individual level (Ipe, 2003; Kettinger et al., 2013; Siemsen, Roth & Balasubramanian, 2008). On this basis, we test whether – and how – the opportunity and ability to share knowledge might also improve employees' rates of innovative behaviours.

Overall, our study offers scholars an original perspective on how employees who share their knowledge with peers might, by so doing, also stimulate and positively affect their own propensity and capacity to generate, promote and apply new ideas in their organizations.

Theoretical Background and Hypothesis Development

Knowledge Sharing and Innovative Work Behaviour

Innovative work behaviour (IWB) denotes the intentional creation, introduction and application of new ideas that benefit work-role, group or organizational performance (De Jong & den Hartog, 2010; Janssen, 2000; Scott & Bruce, 1994). IWB encompasses three separate tasks: *idea generation*, i.e. developing novel ideas; *idea promotion*, i.e. obtaining external support; and *idea application*, i.e. producing a model or prototype of the idea. The scope of IWB includes innovations to products, services and/or work processes. Examples of IWB in healthcare organizations (our empirical setting) include doctors developing new criteria for the diagnosis of patients, or promoting new therapeutic approaches; nurses promoting and engaging in teamwork to develop new guidelines for patient–nurse and family–nurse communication; physiotherapists adopting scientific evidence and international guidelines to modify rehabilita-

tion approaches and techniques (Kessel, Hannemann-Weber & Kratzer, 2012; Kessel, Kratzer & Schultz, 2012; Reuvers et al., 2008).

Individuals who engage in IWB must constantly manage knowledge, and in particular elaborate, recombine, translate and disseminate tacit knowledge (Nonaka, 1994; Quintane et al., 2011). Idea generation is a process of knowledge creation that requires recombining internal and external knowledge into new forms (Koruna, 2004; Popadiuk & Choo, 2006). During idea promotion, individuals do not merely transmit information and data about the proposed innovation, but must also 'translate' these into a form that is understandable and palatable for other individuals and teams (Caniëls, De Stobbeleir & De Clippeleer, 2014; Howell & Shea, 2001). Finally, during idea application, individuals co-ordinate and integrate different sets of knowledge with other individuals or teams, so that the innovation can be routinized (Glaser, Abelson & Garrison, 1983; Tucker, Nembhard & Edmondson, 2007).

Elaborating, recombining and translating tacit knowledge is likewise also what individuals who share knowledge must do (e.g., to impart task information, know-how, and feedback on products, procedures or services; Bock et al., 2005). When individuals share their knowledge, they do not simply pass on information to others: they also elaborate, combine and 'translate' it into a form that is clear and relevant to the recipient (Davenport & Prusak, 1998; Hansen, Mors & Løvås, 2005; Szulanski, 2002). In so doing, knowledge sharers enhance their own capacity to innovate. Specifically, we argue that, when elaborating, integrating and translating information, knowledge sharers actively reflect on the scope of their knowledge, and on its fit with existing practices and organizations. This exercise enables them to more readily perceive opportunities for change, recombine knowledge into new uses, promote these across the organization, and finally implement them into full-fledged routines.

The above argument resonates with long-established evidence from research in cognitive psychology which states that, for information to be retained in memory and related to other information already in memory, the learner must engage in some sort of cognitive restructuring, or elaboration, of the material (Slavin, 1996). The act of sharing knowledge activates a process of cognitive elaboration and re-elaboration that provides individuals with a new understanding of the knowledge they already have, and supports its mobilization for innovation purposes. We accordingly hypothesize the following:

Hypothesis 1: Employees' knowledge sharing behaviour is positively related to their own innovative behaviour.

Knowledge sharing also enables social interactions that might provide individuals with useful resources for their own innovations (Hansen, 1999). Individual innovation occurs when employees attract support from colleagues and supervisors, especially when this support elicits new information, resources and understanding. Gaining access to such resources requires formal and informal interactions (Klein & Sorra, 1996; Woodman, Sawyer & Griffin, 1993), and knowledge sharing represents a particularly powerful form of social interaction because it instils a norm of reciprocity into the recipients (Gouldner, 1960). Social exchange theory argues that social interactions are regulated by norms of reciprocity, under which individuals feel obliged to return the 'favour' to thank the colleague, but also to avoid social disapproval and organizational stigma (Blau, 1964). By sharing relevant knowledge, a person thus creates a sense of indebtedness in the recipients who will then reciprocate the knowledge received (Watson & Hewett, 2006). In consequence, employees who share more knowledge are more likely to be reciprocated and receive new ideas and support from others – and thus have stronger opportunities to engage in innovative behaviours. Konstantinou and Fincham (2011) suggest that employees 'do not share but trade' their knowledge, as they explicitly expect some return for it in the future. As such, knowledge reciprocation represents an immediate mechanism through which individuals access external knowledge and use it as a stimulus for innovation (Majchrzak, Cooper & Neece, 2004). Based on these arguments, we hypothesize the following:

Hypothesis 2: Knowledge reciprocation mediates the positive link between employees' knowledge sharing behaviour and their own innovative work behaviour.

Knowledge Sharing and the MOA Framework

Managers have widely acknowledged their struggle to mandate and control employees' knowledge sharing, especially in work environments that are characterized by information asymmetries and professional boundaries (Currie, Waring & Finn, 2008; Davenport & Prusak, 1998). Knowledge sharing is a volitional behaviour, depending primarily on what employees 'want to' share rather than 'have to' share (Wang & Noe, 2010). Past

research has often referred to the psychological and behavioural sciences to model the proximal antecedents of knowledge sharing at the individual level (Radaelli, Lettieri & Masella, 2013; Ryu, Ho & Han, 2003). In particular, several studies have employed the motivation-opportunity-ability (MOA) framework (MacInnis, Moorman & Jaworski, 1991; Olander & Thøgersen, 1995) and empirically demonstrated how motivation, opportunity and ability directly and positively affect individuals' knowledge sharing (Huysman & Wulf, 2006; Kelloway & Barling, 2000; Reinholt, Pedersen & Foss, 2011; Siemsen, Roth & Balasubramanian, 2008). Those studies argue that motivation is the most significant antecedent of knowledge sharing because employees intentionally and rationally decide to share knowledge when they favourably assess the benefits to be attained by doing so (Lam & Lambermont-Ford, 2010). In addition to being motivated, individuals must also have the ability to share their knowledge, because knowledge sharing represents a difficult task (Lin & Huang, 2008), especially when tacit, 'sticky' knowledge has to be transmitted to others (Szulanski, 2002). Finally, 'willing and able' employees must also have the opportunity to share their knowledge. Organizational opportunities, in particular, play a key role in knowledge sharing because the transmission of tacit knowledge occurs through a process of osmosis that is both complex and time-consuming (Martin, Currie & Finn, 2009), and work environments need to provide employees with enough time to collect, organize and translate tacit knowledge to others (Siemsen, Roth & Balasubramanian, 2008), as well as with a climate that is supportive of extra-role behaviours (Chow & Chan, 2008).

As a final remark, we must note that there exist two forms of the MOA framework: one in which motivation, opportunity and ability all directly affect an organizational or consumer behaviour (MacInnis, Moorman & Jaworski, 1991), and another in which motivation directly affects the behaviour while opportunity and ability act as moderators (Olander & Thøgersen, 1995). In this study we endorse the first form, as it has been more frequently adopted theoretically, and validated empirically, for knowledge sharing behaviours (e.g., Reinholt, Pedersen & Foss, 2011; Siemsen, Roth & Balasubramanian, 2008). Accordingly, we state the following hypothesis:

Hypothesis 3: Employees' motivation, opportunity and ability to share knowledge are positively related to their knowledge sharing behaviours.

Innovative Work Behaviour and the MOA Framework

The contingencies that drive knowledge sharing – ability and opportunity – can be expected to enable IWB as well. The correlation between ‘ability to share’ and ‘ability to innovate’ has never been demonstrated. However, past research indirectly supports the notion that innovativeness invokes the same set of skills required to share knowledge: elaborating, recombining and translating tacit knowledge into novel forms (Nonaka, 1994; Quintane et al., 2011; Smith, Collins & Clark, 2005) for innovating; versus elaborating, recombining and translating tacit knowledge into a form that is understandable and effective for recipients (Ipe, 2003; Reinholt, Pedersen & Foss, 2011; Siemsen, Roth & Balasubramanian, 2008; Szulanski, 1996; Wang & Noe, 2010) for sharing. If the skills characterizing the ability to share knowledge overlap with those brought to bear during individual innovation, employees with a higher ability to share will also be facilitated in enacting their own IWBs. Furthermore, employees never generate and implement new ideas in isolation from the rest of the organization, but need to exchange information, opinions and experiences with others (Ford, 1996; Hülshager, Anderson & Salgado, 2009; Kanter, 1988). The ability to share knowledge provides a heightened capacity to attract and involve other organizational stakeholders in prospective individual and organizational innovation (Zhou & Li, 2012). Drawing upon this, we hypothesize the following:

Hypothesis 4: Employees’ ability to share knowledge is positively related to their own innovative work behaviours.

The opportunity to share is created by an adequate workload and an open climate (Siemsen, Roth & Balasubramanian, 2008). Workload and open climate are likewise relevant contingencies for employees’ engaging in innovation. Extensive research has demonstrated that a high workload does not give employees the opportunity to innovate their current practices, especially with respect to idea generation (Amabile et al., 1996; Elsbach & Hargadon, 2006; Janssen, 2001; Shalley, Zhou & Oldham, 2004; Taylor & Greve, 2006). As innovation involves the recombination and translation of complex knowledge that is often tacit in nature, employees need time to elaborate new ideas and manage their implementation in the organization. Furthermore, high workloads generate stress (Gillespie et al., 2001; MacDonald, 2003) and, as Elsbach and

Hargadon (2006) argue, employees ‘may move from a state of mindful work, which may increase creativity, to a state of relentlessly mindful work, which may actually decrease creativity’ (p. 472). Finally, high workloads create work environments that do not stimulate employees to perform extra-role behaviours (Amabile et al., 1996).

Likewise, extensive research indicates that innovation is facilitated in work environments where extra-role initiatives are supported – and not just tolerated (Anderson & West, 1998; Baer & Frese, 2003; Ekvall, 1996). Employees who are embedded in a climate of openness and proactivity can be expected to exhibit more in IWBs because they are more likely to reflect on the quality of the knowledge they possess, to be more aware of external opportunities, and to feel safer experimenting with new ideas (Amabile et al., 1996; Anderson & West, 1998; Hülshager, Anderson & Salgado, 2009).

Drawing from these arguments, we hypothesize that work environments with lower workload pressures and a climate of openness and proactivity might represent a positive opportunity to engage in innovative behaviours.

Hypothesis 5: Employees’ opportunity to share knowledge is positively related to their innovative behaviours.

Past research provides no reason to expect a direct link between ‘motivation to share’ and IWBs, i.e., that employees will tend to introduce innovations because they are motivated to share knowledge. Neither is there any reason to expect ‘motivation to share’ to be a proxy for ‘motivation to innovate’. We might argue that knowledge sharing and innovation are two manifestations of an over-arching organizational-citizenship behaviour (Organ, 1997), so that a motivation to act as a ‘good soldier’ (Organ, 1988) will affect both behaviours. Still, this argument does not justify expecting ‘motivation to share’ to be a proxy for ‘motivation to innovate’ or, more specifically, that an employee who is motivated to share is also motivated to innovate. Motivation to innovate is underpinned by an array of factors (e.g., goals, personal innovativeness, extrinsic motivators, return expectations) that are different, or even independent, from those relevant to knowledge sharing (Bhaduri & Kumar, 2011; Fernandez & Pitts, 2011; Lam & Lambermont-Ford, 2010; Radaelli, Lettieri & Masella, 2013). With no apparent reason to expect a direct or approximated cause–effect link, we formulate no hypothesis.

Figure 1 summarizes our overall conceptual framework.

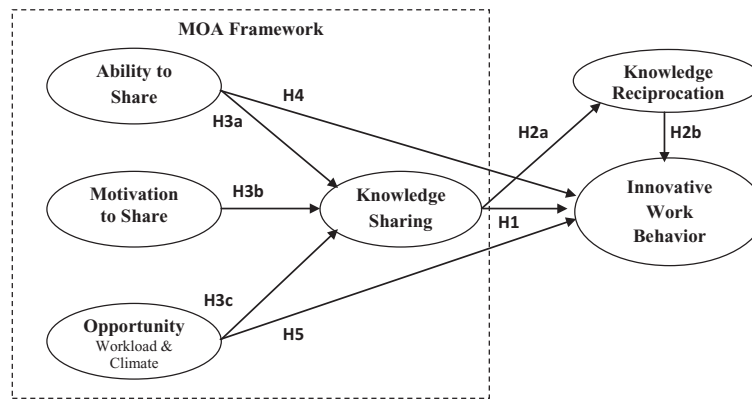


Figure 1 Overall Conceptual Framework

Materials and Methods

The study setting was palliative care organizations (PCOs) for dying cancer patients. PCOs are service organizations with professional expertise where innovation is enacted primarily by doctors and nurses (Hanks et al., 2010). Professional service contexts are privileged settings for a micro-level investigation of innovation. In these contexts, innovation depends heavily on the involvement of employees who stand at the front-line and 'know best' what should be innovated and how (Abbott, 1988; Freidson, 1988). Their involvement in innovative behaviours, however, cannot be mandated or taken for granted, but depends on individual and organizational antecedents (e.g., Kessel, Hannemann-Weber & Kratzer, 2012; Kessel, Kratzer & Schultz, 2012; Reuvers et al., 2008).

The link between knowledge sharing and IWB is also especially salient in these contexts. Professional employees are expected to be knowledge workers who regularly mobilize and transform their knowledge, and yet they rarely do so (Newell et al., 2009). In PCOs, in particular, professionals need to constantly innovate to adapt their care to never-the-same, highly complex cases, and share knowledge to support interdisciplinary practices. However, employees struggle to do so because of the complex and elusive nature of the knowledge they have to handle (Martin, Currie & Finn, 2009). This knowledge, which concerns how health deterioration and treatment decisions should translate into clinical pathways (Faulkner, 1998), is mostly tacit and, in particular: (i) complex, because it integrates clinical, technical and psychological elements; (ii) case-specific, because different patients require different communication and clinical strategies; and (iii) experiential, because professionals are influenced by their training, role and past experiences (Freidson, 1988).

Procedure and Sample

To test the proposed hypotheses we collected data through a survey of four PCOs, all widely recognized by peers as high-quality providers. They are all located in the north-west of Italy and are comparable in terms of size (number of beds and enrolled healthcare professionals) and organizational structure. This allowed the data collected from each PCO to be pooled into a single dataset. All the surveyed PCOs are not-for-profit organizations and provide both home-based and hospice-based care. Health professionals rotate continuously between the two types of services to promote sharing of knowledge and best practices.

Since our unit of analysis was individual professionals, all the data came from primary sources. Control variables were also collected from respondents, and subsequently double-checked using secondary sources of information. The professionals involved in the survey included physicians, psychologists, physiotherapists, nurses and other healthcare operators. Members of administrative staff were not included in this survey because they do not participate in PCO core activities. We thus identified a total of 226 professionals to whom the questionnaires were subsequently sent. Of the returned questionnaires, 150 were considered usable, resulting in a 66 per cent response rate. Table 1 reports the characteristics of our sample.

Measures

We designed a questionnaire to measure six constructs: motivation, opportunity, ability, knowledge sharing behaviour, knowledge reciprocation and innovative work behaviour. All constructs were measured using multiple-item scales that were adapted from previous related studies (see the Appendix). To elicit the behavioural, normative and control beliefs of respondents, we conducted a series of

Table 1. Sample Characteristics

Variable	Mean	s.d.	Variable	N	%
Age	42.65	9.22	Physician	33	22
Professional experience (PE)	15.24	10.22	Nurses	46	31
PE within the PCO	6.78	5.25	Psychologist	14	9
			Physiotherapist	6	4
			Others	51	34
			Total	150	100

face-to-face interviews with personnel from one of the organizations involved. This allowed us to better understand the context in which the constructs were being investigated, and refine the wording of our questions (items). We then pilot-tested our measures with 48 individuals from the same organization to (i) test the clarity of questions and (ii) assess the ability of our scales to capture the desired information. Feedback from the pilot-test was used to refine the scales. The resultant final questionnaire consisted of six multiple-item scales, for a total of 22 items, each measured on a 7-point Likert scale anchored at 1 ('I totally disagree') and 7 ('I totally agree').

The MOA variables were drawn from the literature and adapted to the healthcare context. *Motivation* was developed drawing from Bock et al. (2005) and Hsu et al. (2007). The four items measure an individual's motivation to effectively and frequently share knowledge with co-workers. *Opportunity* was measured with four items adapted from Bock et al. (2005), and captures an individual's control over knowledge sharing as a function of organizational climate and workload. The four-item scale for *ability* was adapted from Armitage and Conner (1999), and measures the extent to which individuals are able to share knowledge. *Knowledge sharing behaviour* was measured with four items adapted from Daft (2001) and Wasko and Faraj (2005) to assess the extent to which individuals engage in knowledge sharing activities in different work-related situations. *Knowledge reciprocation* was measured with two items adapted from Wasko and Faraj (2005). This scale captures the extent to which an individual receives new data, information and ideas in reciprocation for his/her knowledge sharing effort. Finally, the scale for *Innovative work behaviour* was adapted from Janssen (2000). The resulting four-item measure captures how frequently individuals engage in micro innovations to improve their practice.

We also included control variables, namely: age, professional experience, professional

experience within the specific PCO (all measured as the natural logarithm of the number of years), gender and professional role (physician, psychologist, physiotherapist, nurse, other; all measured as dummies).

Analyses

We validated our research hypotheses using partial least squares (PLS). This structural equation modelling (SEM) technique has been widely employed in past research because of its advantages for latent variable modelling (see Chin, 1998 and Reinartz, Haenlein & Henseler, 2009, who exhaustively addressed this issue). We adopted PLS because it provides higher statistical power than covariance-based SEM when dealing with samples of small or moderate size (Reinartz, Haenlein & Henseler, 2009). Also, it has minimal conditions on residual distributions and does not require assumptions on multivariate normality of the data. All the analyses were run using the software Smart-PLS 2.0 (beta) (Ringle, Wende & Will, 2005).

Results

Measurement Model

To assess the psychometric properties of model constructs, we performed validity and reliability tests using PLS confirmatory factor analysis, as suggested by previous research in the field (Chin, 1998; Gefen, Straub & Boudreau, 2000; Vinzi et al., 2010). With respect to convergent validity, all the indicators were found to load well on their hypothesized factor (factor loadings were above the 0.70 threshold) except for item KS4. However, as KS4 did not cross-load relevantly, we decided to retain it in the subsequent analysis. Also, the loadings of the indicators on their respective constructs were higher than the cross-loadings on other constructs. Based on these results, convergent validity was supported (see Table 2). Discriminant validity was

Table 2. Results of Confirmatory Factor Analysis

	Motivation	Opportunity	Ability	Reciprocation	KS Behaviour	Innovative Work Behaviour
MOT1	0.85	0.42	0.09	0.31	0.61	0.33
MOT2	0.80	0.27	0.13	0.33	0.48	0.19
MOT3	0.82	0.20	0.09	0.28	0.41	0.14
MOT4	0.84	0.33	0.08	0.24	0.49	0.35
OPP1	0.38	0.75	0.18	0.19	0.41	0.37
OPP3	0.27	0.81	0.21	0.33	0.30	0.32
OPP4	0.21	0.75	0.18	0.38	0.29	0.35
ABIL2	0.12	0.04	0.78	-0.06	0.28	0.40
ABIL3	0.06	0.26	0.80	0.09	0.24	0.28
ABIL4	0.09	0.32	0.86	0.09	0.31	0.34
REC1	0.22	0.33	0.04	0.89	0.27	0.25
REC2	0.39	0.31	0.02	0.79	0.26	0.11
KS1	0.45	0.37	0.20	0.24	0.79	0.44
KS2	0.39	0.34	0.32	0.18	0.71	0.41
KS3	0.51	0.35	0.20	0.30	0.81	0.38
KS4	0.48	0.25	0.31	0.21	0.68	0.30
IB1	0.32	0.43	0.38	0.23	0.47	0.87
IB2	0.26	0.40	0.32	0.22	0.42	0.88
IB3	0.29	0.37	0.39	0.18	0.47	0.92
IB4	0.28	0.43	0.42	0.18	0.47	0.92
Composite reliability	0.90	0.81	0.86	0.83	0.84	0.94
AVE	0.69	0.59	0.66	0.71	0.56	0.80

Table 3. Inter-Construct Correlation

	Mean	s.d.	1	2	3	4	5	6
1. Motivation	6.21	0.78	0.83					
2. Opportunity	5.18	0.97	0.38	0.77				
3. Ability	5.23	1.08	0.12	0.25	0.82			
4. Reciprocation	5.65	0.87	0.35	0.38	0.04	0.84		
5. Knowledge sharing behaviour	5.59	0.84	0.61	0.44	0.34	0.31	0.75	
6. Innovative work behaviour	5.12	1.08	0.32	0.45	0.42	0.22	0.51	0.90

N = 150. On the diagonal the square root of the AVE.

assessed by showing that the square root of the average variance extracted (AVE) was greater than all of the inter-construct correlations. The results in Table 3 suggest that our measurement model has sufficient discriminant validity. The composite reliability coefficients and the AVE were calculated to assess the reliability of model constructs. The results in Table 2

show that the composite reliability of all constructs was above the recommended 0.80 threshold. Also, the average variances extracted by our measures were all above the 0.50 acceptability level. All these results suggest that the measurement model exhibits good psychometric properties. These analyses also led us to exclude two items (OPP2 and

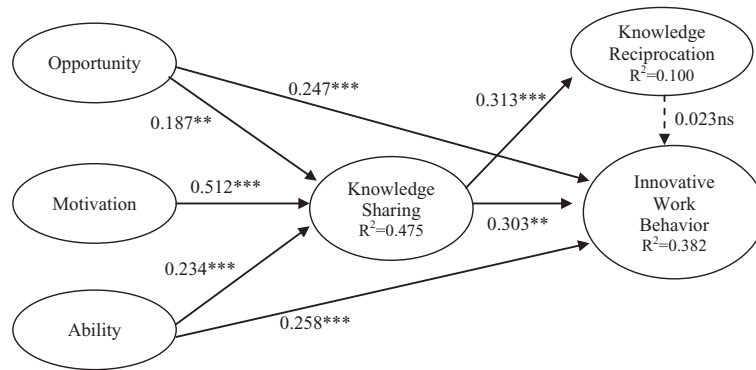


Figure 2 PLS Results of the Structural Model

ABIL1) that did not satisfy the proposed criteria (see the Appendix).

As all the data were self-reported, and the same individual reported both the dependent and independent variables, we addressed the concern of common method bias as recommended in the literature. To this end, we reverse-coded one item to reduce respondents' bias (Podsakoff et al., 2003). In addition, we used the Harman's one-factor test, which indicates that common method variance is present when one factor accounts for a majority of the covariance in the variables. Applying the test to our data showed that six factors arise with eigenvalues higher than one, and each factor explains roughly equal variance. Therefore, our data do not exhibit substantial common method bias.

Hypotheses Test

Figure 2 shows the standardized PLS path coefficients. The control variables used in this study did not show significant relations, and are therefore not reported in the figure. We initially included in the model a direct link between motivation to share and IWB which, as expected, was not significant ($\beta = 0.003$, $p > 0.05$), and was thus dropped from the model. To assess the statistical significance of the path coefficients, which are standardized betas, a bootstrap analysis (with 300 replications) was performed.

The model explained 47 per cent of the variance in knowledge sharing behaviour, 38 per cent of the variance in innovative behaviour, and 10 per cent of the variance in our construct capturing the level of reciprocation.

The results support Hypothesis 1, which posits a direct effect of knowledge sharing on innovative behaviour ($\beta = 0.303$, $p < 0.01$), but they do not support Hypothesis 2, which posits a mediating effect of reciprocation on the link between knowledge sharing and inno-

vative behaviour. The results show that knowledge sharing positively affects reciprocation ($\beta = 0.313$, $p < 0.001$); however, reciprocation does not affect innovative behaviour ($\beta = 0.023$, $p > 0.05$).

These findings fully support our third hypothesis, since all three MOA variables positively affect knowledge sharing ($\beta = 0.512$, $p < 0.001$ for motivation; $\beta = 0.187$, $p < 0.01$ for opportunity; $\beta = 0.234$, $p < 0.001$ for ability).

Finally, the results also fully support Hypotheses 4 and 5. Both the relationship between ability and innovative behaviour ($\beta = 0.258$, $p < 0.001$), and that between opportunity and innovative behaviour ($\beta = 0.247$, $p < 0.001$), are positive and statistically significant.

Discussion

The involvement of employees in generating, promoting and applying new ideas is crucial for organizational development, especially in professionalized service contexts where top-down control and management are unfeasible (Anand, Gardner & Morris, 2007; McNulty & Ferlie, 2004). Most of the research on this question to date has pursued a managerial perspective, investigating how organizations can elicit employees' abilities and opportunities to innovate through job design, knowledge management systems and HRM practices (Abstein & Spieth, 2014; Dorenbosch, van Engen & Verhagen, 2005), and affect their motivation to engage in extra-role behaviours through procedural justice, fairness and meritocracy (De Jong & den Hartog, 2007; Janssen, 2004; Ramamoorthy et al., 2005; Reuvers et al., 2008). Our work instead shifts attention to the individual level of analysis, where evidence is focused on the role of personality, motivation, cognitive ability, job characteristics and mood states (Anderson et al., 2004). Understanding

whether – and how – engaging in specific *behaviours* can also affect IWBs remains an overlooked area of investigation, which this study seeks to address. There is evidence that knowledge acquisition enables employees and organizations to innovate (Lewin, Massini & Peeters, 2011; Zahra & George, 2002), and also that knowledge sharing promotes the recipient's (individual or organization) innovativeness (Liu & Phillips, 2011; Tsai, 2001). This leaves an unexplored grey area: Does knowledge sharing also promote the innovativeness of the person who does the sharing? To clarify this point, we disentangled three possible mechanisms: (i) an indirect effect, grounded in past research, whereby knowledge sharing creates, through reciprocity, the conditions for future knowledge acquisition; (ii) a direct effect, thus far unexplored, whereby knowledge sharing brings into play a process of knowledge recombination and re-elaboration that stimulates the generation, promotion and application of new ideas; (iii) a distal effect, likewise unexplored, whereby the same contingencies that trigger knowledge sharing also have effects on the engagement in IWBs. Contrary to expectations, our results supported only the two unexplored mechanisms (ii) and (iii), whereas they did not support mechanism (i).

The absence of an indirect effect (based on future reciprocity) of knowledge sharing on innovativeness calls into question whether acquiring knowledge is in itself enough to promote IWBs, at least in professional service contexts. Although we did not investigate whether employees interpret knowledge sharing behaviours as a generous gift or as an explicit trade (Konstantinou & Fincham, 2011), our results do confirm that knowledge sharing is an effective tactic for acquiring external knowledge through reciprocation. However, it appears that the knowledge thereby acquired does not necessarily lead to IWBs. Drawing on previous research, we could argue this happens because knowledge in professional services is so expert, experiential, intangible and specialized that recipients – when they come to reciprocate – might not be aware of what knowledge is most relevant to helping the sharer innovate, or they might hoard their relevant knowledge without being sanctioned by the sharer (Freidson, 1988; Sharma, 1997; von Nordenflycht, 2010). Thus, reciprocation might not benefit IWB either because recipients opportunistically hoard the truly relevant information (i.e., provide enough knowledge not to appear 'empty-handed', but not enough to compromise personal autonomy), or unintentionally communicate knowledge that does not fit with the sharers' work (i.e., recipients

do not know 'what' to reciprocate), is not clear or ready-for-use (i.e., recipients do not know 'how' to reciprocate), or is relevant only for everyday work (McDermott & O'Dell, 2001; Szulanski, 1996; Wang & Noe, 2010). Overall, our study casts doubts on sharing knowledge to induce reciprocation as an effective tactic for facilitating personal IWB, and in particular, on the value of reciprocated knowledge.

Having thus ruled out reciprocation, we can now consider whether the act itself of managing and elaborating internal knowledge (inherent in the sharing process) stimulates employees' IWB. Our findings contribute some new, individual-level insights into the advantages of knowledge sharing. Previous studies have demonstrated the value of knowledge sharing at the organizational level, noting how systems where collectives of individuals mobilize their knowledge develop heightened capacities to adapt, improvise and change (Maurer, Bartsch & Ebers, 2011; Nonaka, 1994). Research on 'absorptive capacity' (Cohen & Levinthal, 1990; Lane, Koka & Pathak, 2006; Zahra & George, 2002), in particular, has shown how knowledge sharing behaviours which aggregate into 'internal meta-routines' (Lewin, Massini & Peeters, 2011) can affect organizations' transformation and exploitation capacities (Volberda, Foss & Lyles, 2010). Our study instead highlights how, at the individual level, knowledge sharing behaviours can also directly affect employees' capabilities to transform and exploit internal knowledge. In other words, while Zahra and George (2002) observed that organizational 'knowledge exploitation requires the sharing of relevant knowledge among members of the firm in order to promote mutual understanding and comprehension' (p. 194), we here argue that individual knowledge exploitation also requires knowledge sharing to improve that individual's own understanding and comprehension. Furthermore, knowledge sharing is a dynamic behaviour that constantly calls into question the viability of organizational routines, and thus creates the conditions for their innovation. These results could contribute to the research on organizational routines that attempts to draw the line between mindless replication and effortful accomplishment (Becker, 2004). We believe knowledge sharing can offer a way to overcome mindless replication of routines. By requiring the elaboration, translation and recombination of internal knowledge, sharing infuses thoughtfulness into everyday work and so creates the conditions for challenging routines and engaging in IWB.

Finally, the role of MOA antecedents is also notable. This work confirms the long-standing

notion that motivation, opportunity and ability are proximal antecedents that adeptly explain knowledge sharing behaviours (Ipe, 2003). Our results also confirm Siemsen, Roth and Balasubramanian (2008), insofar as motivation is the primary enabler of knowledge sharing, possibly suggesting that motivated professionals might overcome problems in ability and opportunity, more than vice versa. However, these results also show that the ability and opportunity that are relevant for knowledge sharing also affect engagement in IWBs. The ability to share knowledge can thus be understood as a proxy for employees' capability to manage knowledge in its entirety. Innovation, in particular, is a complex behaviour that involves the acquisition, recombination, communication and application of knowledge. Our findings provide further empirical evidence that the skill-set required for knowledge sharing overlaps with that required for innovation, which needs the ability to elaborate, re-combine and disseminate knowledge. Another requirement common to both knowledge sharing and IWBs is a supportive work environment. Both are proactive behaviours and thus depend upon a work environment where the workload and climate support extra-role efforts. Our results confirm that the opportunities driving employees to share knowledge do not conflict with those driving IWBs. Overall, we can argue that knowledge sharing and IWBs might both be fostered through a common set of organizational-level interventions (e.g., knowledge education and training, and a supportive climate and workload). At the same time, the (expected) lack of correlation between motivation to share and IWB confirms their differences. Thus, while certain interventions might facilitate both behaviours, organizations need two distinct strategies to *trigger* them, because employees perceive distinct personal and organizational costs, benefits and threats when they share or innovate.

Practical Implications

Knowledge sharing does not consist merely in communicating information, but is rather a *structured* process of knowledge elaboration and codification that makes the knowledge clearer not just to the recipients, but also to its possessor. Engaging in knowledge sharing behaviours carries a high individual cost in terms of time, effort and potential personal disadvantages, but also delivers personal benefits to employees in terms of reciprocation and support for innovation. Organizations should stimulate knowledge sharing beyond the usual emphasis on it as a 'gift' or 'trade' transaction (Konstantinou & Fincham, 2011),

presenting it also as a convenient 'workout' that can improve employees' understanding of local routines and environments, and their capability to introduce innovation at work.

Managers and Chief Information Officers (CIOs) are thus called upon to overcome a persistent belief that 'structured' knowledge sharing is merely a waste of time. They can consider the MOA antecedents of knowledge sharing and design initiatives that affect them. Our results confirm that knowledge sharing depends on individuals' motivation, opportunity and ability. Managers and CIOs should accordingly build an organizational and technological environment that creates the conditions for the exchange of tacit knowledge. Information and communication technologies (ICTs) offer an opportunity for easier and more efficient inter-employee knowledge sharing, avoiding the risk of increasing professionals' workload, worsening the organizational climate, or having the costs of knowledge sharing outbalance its benefits. Overall, we can highlight the importance of designing initiatives at the organizational level that (i) place knowledge sharing front and centre as a priority for both the organization and employees, and (ii) alleviate the potential constraints on knowledge sharing at the employee level. Neglecting this need could result in initiatives that soon fail because they are unable to create the preconditions for individual action.

Conclusions

This study sheds new light on the relationship between knowledge and innovation by adopting a micro-level perspective. We surveyed healthcare professionals within the peculiar, knowledge-intensive context of palliative care, and our results show that employees who share their knowledge are more likely to engage in IWBs. Our findings also indicate that two preconditions for individual knowledge sharing – namely, employees' ability and opportunity – also directly affect innovative behaviours. This implies that a common underlying factor explains why employees who are better able to share knowledge are more likely to innovate, and why employees who have the opportunity to share knowledge are more likely to innovate. This study paves the way for further research, preferably in different professional settings, aimed at confirming or refuting its results and refining its theoretical and managerial implications.

Finally, this work has some inherent limitations that should be addressed in future research. Firstly, we specifically focused on

healthcare organizations. Although this work environment might be particularly effective for studying the knowledge–innovation link, future research could be extended to other services environments, such as call-centres, schools and police departments. Secondly, we mainly explored the sharing of tacit knowledge among employees. While tacit knowledge certainly represents a type of knowledge that is particularly difficult and ‘tricky’ to share – and for this reason deserves specific research attention – future studies might investigate whether and how the sharing of explicit knowledge (e.g., formal organizational processes, databases, job descriptions) might also affect employees’ innovative behaviour. Furthermore, the cross-sectional nature of this study prevents us from drawing definite causal inferences about the relationships between variables. Future longitudinal studies might address this issue. Follow-up studies could also improve our model by adding further variables that more comprehensively explain the mediating mechanisms that translate knowledge sharing into innovative behaviour, and the reasons why employees’ ability and opportunity to share knowledge are conducive to their engaging in those behaviours.

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References

- Abbott, A.D. (1988) *The System of Professions: An Essay on the Division of Expert Labor*. University of Chicago Press, Chicago, IL.
- Abstein, A. and Spieth, P. (2014) Exploring HRM Meta-Features that Foster Employees’ Innovative Work Behaviour in Times of Increasing Work–Life Conflict. *Creativity and Innovation Management*, 23, 211–25.
- Amabile, T.M., Conti, R., Coon, H., Lazenby, J. and Herron, M. (1996) Assessing the Work Environment for Creativity. *Academy of Management Journal*, 39, 1154–84.
- Anand, N., Gardner, H.K. and Morris, T. (2007) Knowledge-Based Innovation: Emergence and Embedding of New Practice Areas in Management Consulting Firms. *Academy of Management Journal*, 50, 406–28.
- Anderson, N.R. and West, M.A. (1998) Measuring Climate for Work Group Innovation: Development and Validation of the Team Climate Inventory. *Journal of Organizational Behavior*, 19, 235–58.
- Anderson, N., De Dreu, C.K. and Nijstad, B.A. (2004) The routinization of innovation research: A constructively critical review of the state-of-the-science. *Journal of Organizational Behavior*, 25(2), 147–73.
- Armitage, C.J. and Conner, M. (1999) Predictive Validity of the Theory of Planned Behavior: the Role of Questionnaire Format and Social Desirability. *Journal of Community & Applied Social Psychology*, 9, 261–74.
- Aulawi, H., Sudirman, I., Suryadi, K. and Govindaraju, R. (2009) Knowledge Sharing Behaviour, Antecedent and Their Impact on the Individual Innovation Capability. *Journal of Applied Sciences Research*, 5, 2238–45.
- Baer, M. and Frese, M. (2003) Innovation is Not Enough: Climates for Initiative and Psychological Safety, Process Innovations, and Firm Performance. *Journal of Organizational Behavior*, 24, 45–68.
- Becker, M.C. (2004) Organizational Routines: A Review of the Literature. *Industrial and Corporate Change*, 13, 643–78.
- Bhaduri, S. and Kumar, H. (2011) Extrinsic and Intrinsic Motivations to Innovate: Tracing the Motivation of ‘Grassroot’ Innovators in India. *Mind & Society*, 10, 27–55.
- Blau, P.M. (1964) *Exchange and Power in Social Life*. John Wiley, New York.
- Bock, G.W., Zmud, R.W., Kim, Y.G. and Lee, J.N. (2005) Behavioral Intention Formation in Knowledge Sharing: Examining the Role of Extrinsic Motivators, Social-Psychological Force and Organizational Climate. *MIS Quarterly*, 29, 87–111.
- Caniëls, M.C., De Stobbeleir, K. and De Clippelaar, I. (2014) The Antecedents of Creativity Revisited: A Process Perspective. *Creativity and Innovation Management*, 23, 96–110.
- Chin, W.W. (1998) The Partial Least Squares Approach to Structural Equation Modeling. In Marcoulides, G.A. (ed.), *Modern Methods for Business Research*. Lawrence Erlbaum Associates, Mahwah, NJ, pp. 295–336.
- Chow, W.S. and Chan, L.S. (2008) Social Network, Social Trust and Shared Goals in Organizational Knowledge Sharing. *Information & Management*, 45, 458–65.
- Cohen, W.M. and Levinthal, D.A. (1990) Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35, 128–52.
- Currie, G., Waring, J. and Finn, R. (2008) The Limits of Knowledge Management for Public Services Modernization: The Case of Patient Safety & Service Quality. *Public Administration*, 86, 363–85.
- Daft, R. (2001) *Organization Theory and Design*. South-Western Publishing, Cincinnati, PA.
- Davenport, T.H. and Prusak, L. (1998) *Working Knowledge: How Organizations Manage What They Know*. Harvard Business School Press, Boston, MA.
- De Jong, J.P. and den Hartog, D. (2007) How Leaders Influence Employees’ Innovative Behaviour. *European Journal of Innovation Management*, 10, 41–64.
- De Jong, J.P. and den Hartog, D. (2010) Measuring Innovative Work Behaviour. *Creativity and Innovation Management*, 19, 23–36.

- Dorenbosch, L., van Engen, M.L. and Verhagen, M. (2005) On-the-Job Innovation: The Impact of Job Design and Human Resource Management through Production Ownership. *Creativity and Innovation Management*, 14, 129–41.
- Ekvall, G. (1996) Organizational Climate for Creativity and Innovation. *European Journal of Work and Organizational Psychology*, 5, 105–23.
- Elsbach, K.D. and Hargadon, A.B. (2006) Enhancing Creativity through 'Mindless' Work: A Framework of Workday Design. *Organization Science*, 17, 470–83.
- Faulkner, A. (1998) Communication with Patients, Families and Other Professionals. *British Medical Journal*, 316, 130–2.
- Fernandez, S. and Pitts, D.W. (2011) Understanding Employee Motivation to Innovate: Evidence from Front Line Employees in United States Federal Agencies. *Australian Journal of Public Administration*, 70, 202–22.
- Ford, C.M. (1996) A Theory of Individual Creative Action in Multiple Social Domains. *Academy of Management Review*, 21, 1112–42.
- Freidson, E. (1988) *Profession of Medicine: A Study of the Sociology of Applied Knowledge*. University of Chicago Press, Chicago, IL.
- Gefen, D., Straub, D. and Boudreau, M.-C. (2000) Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of the AIS*, 4, Article 7.
- Gillespie, N.A., Walsh, M., Winefield, A.H., Dua, J. and Stough, C. (2001) Occupational Stress in Universities: Staff Perceptions of the Causes, Consequences and Moderators of Stress. *Work & Stress*, 15, 53–72.
- Glaser, E.M., Abelson, H.H. and Garrison, K.N. (1983) *Putting Knowledge to Use: Facilitating the Diffusion of Knowledge and the Implementation of Planned Change*. Jossey-Bass, San Francisco, CA.
- Gouldner, A. (1960) The Norm of Reciprocity: A Preliminary Statement. *American Sociological Review*, 25, 161–78.
- Hanks, G., Cherny, N.I., Christakis, N.A., Fallon, M., Kaasa, S. and Portenoy, R.K. (2010) *Oxford Textbook of Palliative Medicine*, 4th edn. Oxford University Press, Oxford.
- Hansen, M.T. (1999) The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits. *Administrative Science Quarterly*, 44, 82–111.
- Hansen, M.T., Mors, M.L. and Løvås, B. (2005) Knowledge Sharing in Organizations: Multiple Networks, Multiple Phases. *Academy of Management Journal*, 48, 776–93.
- Howell, J.M. and Shea, C.M. (2001) Individual Differences, Environmental Scanning, Innovation Framing, and Champion Behavior: Key Predictors of Project Performance. *Journal of Product Innovation Management*, 18, 15–27.
- Howell, K.E. and Annansingh, F. (2013) Knowledge Generation and Sharing in UK Universities: A Tale of Two Cultures? *International Journal of Information Management*, 33, 32–9.
- Hsu, M.H., Ju, T.L., Yen, C.H. and Chang, C.M. (2007) Knowledge Sharing Behavior in Virtual Communities: The Relationship between Trust, Self-Efficacy, and Outcome Expectations. *International Journal of Human-Computer Studies*, 65, 153–69.
- Hülsheger, U.R., Anderson, N. and Salgado, J.F. (2009) Team-Level Predictors of Innovation at Work: A Comprehensive Meta-Analysis Spanning Three Decades of Research. *Journal of Applied Psychology*, 94, 1128–45.
- Huysman, M. and Wulf, V. (2006) IT to Support Knowledge Sharing in Communities, towards a Social Capital Analysis. *Journal of Information Technology*, 21, 40–51.
- Ipe, M. (2003) Knowledge Sharing in Organizations: A Conceptual Framework. *Human Resource Development Review*, 2, 337–59.
- Janssen, O. (2000) Job Demands, Perceptions of Effort-Reward Fairness and Innovative Work Behaviour. *Journal of Occupational and Organizational Psychology*, 73, 287–302.
- Janssen, O. (2001) Fairness Perceptions as a Moderator in the Curvilinear Relationships between Job Demands, and Job Performance and Job Satisfaction. *Academy of Management Journal*, 44, 1039–50.
- Janssen, O. (2004) How fairness perceptions make innovative behavior more or less stressful. *Journal of Organizational Behavior*, 25(2), 201–15.
- Kanter, R. (1988) When a Thousand Flowers Bloom: Structural, Collective, and Social Conditions for Innovation in Organizations. In Staw, B.M. and Cummings, L.L. (eds.), *Research in Organizational Behavior*, vol. 10, JAI Press, Greenwich, CT, pp. 169–211.
- Kelloway, E.K. and Barling, J. (2000) Knowledge Work as Organizational Behavior. *International Journal of Management Reviews*, 2, 287–304.
- Kessel, M., Hannemann-Weber, H. and Kratzer, J. (2012) Innovative Work Behavior in Healthcare: The Benefit of Operational Guidelines in the Treatment of Rare Diseases. *Health Policy*, 105, 146–53.
- Kessel, M., Kratzer, J. and Schultz, C. (2012) Psychological Safety, Knowledge Sharing, and Creative Performance in Healthcare Teams. *Creativity and Innovation Management*, 21, 147–57.
- Kettinger, W.J., Li, Y., Davis, J.M. and Kettinger, L. (2013) The Roles of Psychological Climate, Information Management Capabilities, and IT Support on Knowledge-Sharing: An MOA Perspective. *European Journal of Information Systems*, doi:10.1057/ejis.2013.25.
- Klein, K.J. and Sorra, J.S. (1996) The Challenge of Innovation Implementation. *Academy of Management Review*, 21, 1055–80.
- Konstantinou, E. and Fincham, R. (2011) Not Sharing but Trading: Applying a Maussian Exchange Framework to Knowledge Management. *Human Relations*, 64, 823–42.
- Koruna, S. (2004) Leveraging Knowledge Assets: Combinative Capabilities – Theory and Practice. *R&D Management*, 34, 505–16.
- Lam, A. and Lambermont-Ford, J.P. (2010) Knowledge Sharing in Organisational Contexts: A Motivation-Based Perspective. *Journal of Knowledge Management*, 14, 51–66.
- Lane, P.J., Koka, B.R. and Pathak, S. (2006) The Reification of Absorptive Capacity: A Critical Review and Rejuvenation of the Construct. *Academy of Management Review*, 31, 833–63.

- Lewin, A.Y., Massini, S. and Peeters, C. (2011) Microfoundations of Internal and External Absorptive Capacity Routines. *Organization Science*, 22, 81–98.
- Lin, H.F. (2007) Knowledge Sharing and Firm Innovation Capability: An Empirical Study. *International Journal of Manpower*, 28, 315–32.
- Lin, T. and Huang, C. (2008) Understanding Knowledge Management System Usage Antecedents: An Integration of Social Cognitive Theory and Task Technology Fit. *Information & Management*, 45, 410–17.
- Liu, Y. and Phillips, J.S. (2011) Examining the Antecedents of Knowledge Sharing in Facilitating Team Innovativeness from a Multilevel Perspective. *International Journal of Information Management*, 31, 44–52.
- Lu, L., Lin, X. and Leung, K. (2012) Goal Orientation and Innovative Performance: The Mediating Roles of Knowledge Sharing and Perceived Autonomy. *Journal of Applied Social Psychology*, 42, E180–97.
- MacCurtain, S., Flood, P.C., Ramamoorthy, N., West, M.A. and Dawson, J.F. (2010) The Top Management Team, Reflexivity, Knowledge Sharing and New Product Performance: A Study of the Irish Software Industry. *Creativity and Innovation Management*, 19, 219–32.
- MacDonald, W. (2003) The Impact of Job Demands and Workload on Stress and Fatigue. *Australian Psychologist*, 38, 102–17.
- MacInnis, D.J., Moorman, C. and Jaworski, B.J. (1991) Enhancing and Measuring Consumers' Motivation, Opportunity, and Ability to Process Brand Information from Ads. *Journal of Marketing*, 55, 32–53.
- Majchrzak, A., Cooper, L.P. and Neece, O. (2004) Knowledge Reuse for Innovation. *Management Science*, 50, 174–88.
- Martin, G.P., Currie, G. and Finn, R. (2009) Reconfiguring or Reproducing Intra-Professional Boundaries? Specialist Expertise, Generalist Knowledge and the 'Modernization' of the Medical Workforce. *Social Science & Medicine*, 68, 1191–8.
- Maurer, I., Bartsch, V. and Ebers, M. (2011) The Value of Intra-Organizational Social Capital: How It Fosters Knowledge Transfer, Innovation Performance, and Growth. *Organization Studies*, 32, 157–85.
- McDermott, R. and O'Dell, C. (2001) Overcoming Cultural Barriers to Sharing Knowledge. *Journal of Knowledge Management*, 5, 76–85.
- McNulty, T. and Ferlie, E. (2004) Process Transformation: Limitations to Radical Organizational Change within Public Service Organizations. *Organization Studies*, 25, 1389–412.
- Mura, M., Lettieri, E., Radaelli, G. and Spiller, N. (2013) Promoting Professionals' Innovative Behaviour through Knowledge Sharing: The Moderating Role of Social Capital. *Journal of Knowledge Management*, 17, 527–44.
- Newell, S., Robertson, M., Scarbrough, H. and Swan, J. (2009) *Managing Knowledge Work and Innovation*. Palgrave Macmillan, Basingstoke.
- Nonaka, I. (1994) A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5, 14–37.
- Olander, F. and Thøgersen, J. (1995) Understanding of Consumer Behaviour as a Prerequisite for Environmental Protection. *Journal of Consumer Policy*, 18, 317–57.
- Organ, D.W. (1988) *Organizational Citizenship Behavior: The Good Soldier Syndrome*. Lexington Books, Lexington, MA.
- Organ, D.W. (1997) Organizational Citizenship Behavior: It's Construct Clean-Up Time. *Human Performance*, 10, 85–97.
- Podsakoff, P.M., MacKenzie, S.B., Jeong-Yeon, L. and Podsakoff, N.P. (2003) Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology*, 88, 879–903.
- Popadiuk, S. and Choo, C.W. (2006) Innovation and Knowledge Creation: How Are These Concepts Related? *International Journal of Information Management*, 26, 302–12.
- Quintane, E., Casselman, R.M., Reiche, B.R. and Nylund, P.A. (2011) Innovation as a Knowledge-Based Outcome. *Journal of Knowledge Management*, 15, 928–47.
- Radaelli, G., Lettieri, E. and Masella, C. (2013) Physicians' Willingness to Share: A TPB-Based Analysis. *Knowledge Management Research and Practice*, 9, 342–52.
- Ramamoorthy, N., Flood, P.C., Slattery, T. and Sardesai, R. (2005) Determinants of Innovative Work Behaviour: Development and Test of an Integrated Model. *Creativity and Innovation Management*, 14, 142–50.
- Reinartz, W., Haenlein, M. and Henseler, J. (2009) An Empirical Comparison of the Efficacy of Covariance-Based and Variance-Based SEM. *International Journal of Research in Marketing*, 26, 332–44.
- Reinholt, M., Pedersen, T. and Foss, N.J. (2011) Why a Central Network Position Isn't Enough: The Role of Motivation and Ability for Knowledge Sharing in Employee Networks. *Academy of Management Journal*, 54, 1277–97.
- Reuvers, M., Van Engen, M.L., Vinkenburgh, C.J. and Wilson-Evered, E. (2008) Transformational Leadership and Innovative Work Behaviour: Exploring the Relevance of Gender Differences. *Creativity and Innovation Management*, 17, 227–44.
- Ringle, C.M., Wende, S. and Will, A. (2005) SmartPLS 2.0 (beta). SmartPLS, Hamburg.
- Ryu, S., Ho, S.H. and Han, I. (2003) Knowledge Sharing Behavior of Physicians in Hospitals. *Expert Systems with Applications*, 25, 113–22.
- Scott, S.G. and Bruce, R.A. (1994) Determinants of Innovative Behavior: A Path Model of Individual Innovation in the Workplace. *Academy of Management Journal*, 37, 580–607.
- Shalley, C.E., Zhou, J. and Oldham, G.R. (2004) The Effects of Personal and Contextual Characteristics on Creativity: Where Should We Go From Here? *Journal of Management*, 30, 933–58.
- Sharma, A. (1997) Professional as Agent: Knowledge Asymmetry in Agency Exchange. *Academy of Management Review*, 22, 758–98.
- Siemsen, E., Roth, A.V. and Balasubramanian, S. (2008) How Motivation, Opportunity, and Ability Drive Knowledge Sharing: The Constraining-Factor Model. *Journal of Operations Management*, 26, 426–45.

- Slavin, R.E. (1996) Research on Cooperative Learning and Achievement: What We Know, What We Need to Know. *Contemporary Educational Psychology*, 21, 43–69.
- Smith, K.G., Collins, C.J. and Clark, K.D. (2005) Existing Knowledge, Knowledge Creation Capability, and the Rate of New Product Introduction in High-Technology Firms. *Academy of Management Journal*, 48, 346–57.
- Spencer, J.W. (2003) Firms' Knowledge-Sharing Strategies in the Global Innovation System: Empirical Evidence from the Flat Panel Display Industry. *Strategic Management Journal*, 24, 217–33.
- Szulanski, G. (1996) Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm. *Strategic Management Journal*, 17, 27–43.
- Szulanski, G. (2002) *Sticky Knowledge: Barriers to Knowing in the Firm*. Sage, Thousand Oaks, CA.
- Taylor, A. and Greve, H.R. (2006) Superman or the Fantastic Four? Knowledge Combination and Experience in Innovative Teams. *Academy of Management Journal*, 49, 723–40.
- Tsai, W. (2001) Knowledge Transfer in Intraorganizational Networks: Effects of Network Position and Absorptive Capacity on Business Unit Innovation and Performance. *Academy of Management Journal*, 44, 996–1004.
- Tucker, A.L., Nembhard, I.M. and Edmondson, A.C. (2007) Implementing New Practices: An Empirical Study of Organizational Learning in Hospital Intensive Care Units. *Management Science*, 53, 894–907.
- Vinzi, V.E., Chin, W.W., Henseler, J. and Wang, H. (2010) *Handbook of Partial Least Squares: Concepts, Methods and Applications*. Springer, New York.
- Volberda, H.W., Foss, N.J. and Lyles, M.A. (2010) Absorbing the Concept of Absorptive Capacity: How to Realize Its Potential in the Organization Field. *Organization Science*, 20, 352–67.
- Von Nordenflycht, A. (2010) What is a Professional Service Firm? Toward a Theory and Taxonomy of Knowledge-Intensive Firms. *Academy of Management Review*, 35, 155–74.
- Wang, S. and Noe, R.A. (2010) Knowledge Sharing: A Review and Directions for Future Research. *Human Resource Management Review*, 20, 115–31.
- Wasko, M.M. and Faraj, S. (2005) Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice. *MIS Quarterly*, 29, 35–57.
- Watson, S. and Hewett, K. (2006) A Multi-Theoretical Model of Knowledge Transfer in Organizations: Determinants of Knowledge Contribution and Knowledge Reuse. *Journal of Management Studies*, 43, 141–73.
- Woodman, R.W., Sawyer, J.E. and Griffin, R.W. (1993) Toward a Theory of Organizational Creativity. *Academy of Management Review*, 18, 293–321.
- Zahra, S.A. and George, G. (2002) Absorptive Capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review*, 27, 185–203.
- Zhou, K.Z. and Li, C.B. (2012) How Knowledge Affects Radical Innovation: Knowledge Base, Market Knowledge Acquisition, and Internal Knowledge Sharing. *Strategic Management Journal*, 33, 1090–102.

Appendix: Survey Questionnaire

Respondents had to refer to the following definition of knowledge when answering the questionnaire: 'We define knowledge as information useful for your clinical practice. Specifically, we refer here to the exchange among professionals of tacit knowledge, relating to treatment decisions and how they can be translated into a clinical pathway that best supports patients and their families in the final stages of the patient's life'.

Motivation

- MOT1 I intend to frequently share my knowledge with my colleagues.
MOT2 I will always give my knowledge to those who ask for it.
MOT3 I will always try to give my knowledge to others in the most efficient way possible.
MOT4 I intend to frequently share my working experiences with my colleagues.

Opportunity

- OPP1 I can devote enough time to sharing my knowledge.
OPP2 Due to my workload, I have difficulties in effectively sharing my knowledge (R).*
OPP3 The climate in my organization allows me to share my knowledge easily.
OPP4 The climate in my organization facilitates informal meetings where knowledge is shared.

Ability

- ABIL1 I am fully capable of sharing my knowledge with others.*
ABIL2 If it depended only on me, I would exhaustively share my knowledge.
ABIL3 I am fully capable of articulating my knowledge in written or spoken form.
ABIL4 I believe I am fully capable of sharing my knowledge at any time.

Reciprocation

- REC1 My colleagues often share their knowledge with me.
REC2 If I ask my colleagues to share their knowledge with me, they are always ready to do so.

KS Behaviour

- KS1 I usually spend a lot of time sharing my knowledge with my colleagues.
KS2 During meetings, I am usually very active in sharing my knowledge with my colleagues.
KS3 I customarily engage in informal meetings with my colleagues in which I share my working experiences.
KS4 I am usually quick in responding to my colleagues' requests to share my knowledge.

Innovative Behaviour

- IB1 I usually introduce small innovations into my practice.
IB2 I often develop new procedures to improve my everyday practice.
IB3 I often succeed in transforming my innovative ideas into practical solutions.
IB4 I often develop new solutions to solve problems.

R indicates reverse-scored items

* indicates dropped items