Research Article

Psychosocial and Organizational Antecedents of Knowledge Sharing in the Workplace

Antecedentes Psicossociais e Organizacionais do Compartilhamento de Conhecimento no Ambiente de Trabalho

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ABSTRACT

Objective: this paper proposes and evaluates a causal model to explain knowledge sharing among peers in the workplace. The proposed model, based on the Theory of Planned Behavior, includes psychosocial factors (transformational leadership, workgroup identification, and shared understanding) and organizational factors (knowledge sharing opportunities and formalization of knowledge sharing processes) as antecedents of individuals' attitudes, perception of subjective norms associated with their group and their direct supervisor, and intention and effective knowledge-sharing behavior. **Methods:** the model was statistically tested using structural equation modeling techniques with data provided by 131 customer service employees of a large Brazilian telecommunications company. **Results:** the results indicate that the psychosocial elements have a strong influence on knowledge sharing attitudes and practices. The hypotheses associated with behavioral control have not been confirmed. Moreover, the intention to share knowledge does not seem to be affected by the subjective norms associated with the individual's direct supervisor, but only by those related to their group. **Conclusions:** the cognitive proximity between group members, reflected in their perception of shared understanding, was an important element in the elicitation of attitudes favorable to knowledge sharing. Additionally, individuals with greater identification with their group tended to have more positive attitudes toward sharing their knowledge. This attitude tends to be more positive when the individual's direct supervisor adopts a more transformational leadership style. The influence of leaders seems to extend from the development of a culture of knowledge exchange and diffusion of principles that stimulate this exchange, to the creation of opportunities to share knowledge through the active management of knowledge diffusion in their teams.

Keywords: knowledge sharing; Theory of Planned Behavior; transformational leadership; identification; shared understanding.

JEL Code: J81, D20, D80.

RESUMO

Objetivo: este artigo propõe e avalia um modelo causal sobre compartilhamento de conhecimento entre pares no ambiente de trabalho. O modelo proposto, integrado à Teoria do Comportamento Planejado, inclui fatores psicossociais (liderança transformacional, identificação com o grupo de trabalho, e entendimento compartilhado) e organizacionais (oportunidades e formalização de processos de compartilhamento de conhecimento) como antecedentes das atitudes do indivíduo, de sua percepção sobre normas subjetivas associadas a seu grupo e seu supervisor direto, e de sua intenção e comportamento efetivo de compartilhamento de conhecimento. **Métodos:** o modelo foi testado estatisticamente com técnicas de modelagem de equações estruturais, a partir de dados fornecidos por 131 funcionários da área de atendimento ao cliente de uma grande empresa brasileira de telecomunicações. **Resultados:** os resultados indicam que os elementos psicossociais avaliados têm forte influência nas atitudes e práticas de compartilhamento de conhecimento entre pares. As hipóteses associadas ao controle comportamental não foram comprovadas. Além disso, a intenção de compartilhar conhecimento não parece ser afetada pelas normas subjetivas associadas ao supervisor direto do indivíduo, e sim apenas pelas relacionadas a seu grupo. **Conclusões:** a proximidade cognitiva entre os membros do grupo, refletida na percepção do indivíduo de entendimento compartilhado com seu grupo de trabalho, foi um elemento importante na formação de atitudes favoráveis ao compartilhamento de conhecimento. Adicionalmente, indivíduos com maior identificação com o seu grupo tenderam a ter atitudes mais positivas em relação ao compartilhamento de seus conhecimentos. Essa atitude tende a ser mais positiva quando o supervisor direto do indivíduo adota um estilo de liderança mais transformacional. A influência dos líderes parece se estender desde a formação de uma cultura de troca de conhecimento no grupo e difusão de princípios que estimulam essa troca, até a viabilização de oportunidades por meio de uma gestão ativa da difusão de conhecimento nas equipes.

Palavras-chave: compartilhamento de conhecimento; Teoria do Comportamento Planejado; liderança transformacional; identificação; entendimento compartilhado.

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INTRODUCTION

Knowledge plays a critical role in generating competitive advantage and facilitating working relations in organizations (Alavi & Leidner, 2001; Dewhurst, Hancock, & Ellworth, 2013; Z. Wang, Wang, & Liang, 2014). Knowledge Management, involving the application of a set of methods, tools, and techniques, has the primary goal of generating, improving, storing, transferring, reusing, and protecting the knowledge of organizations (Moreno & Santos, 2012; Murray & Peyrefitte, 2007). For companies to obtain a competitive edge based on their knowledge, this must be effectively shared among individuals, areas, and business units (Murray & Peyrefitte, 2007). Although various researchers have stressed the importance of knowledge sharing (Alavi & Leidner, 2001; Kang & Kim, 2010; Levine & Prietula, 2012), few empirical studies have addressed the theme and its conditioning factors in a broad and integrated form. A better understanding of the dynamics of this sharing and its main antecedents is necessary to guide the development of effective programs and solutions to promote the diffusion of knowledge within organizations (Levine & Prietula, 2012).

Given that knowledge sharing occurs during social interactions, here we propose that psychosocial processes are particularly relevant drivers of these exchanges among peers. We stress the role played by leadership and social identities in groups. Several authors have suggested that the behavior of leaders can affect the sharing of knowledge by their subordinates (Bradley, & Liang, 2011; Le & Lei, 2019; Xue, Zhang, Wang, & Zhang, 2018). However, the mechanisms by which this influence occurs have yet to be elucidated from the theoretical-conceptual standpoint, and require empirical verification when integrated with the central concepts and dynamics already consolidated in the literature on knowledge sharing (Donato, Hedler, & Coelho Junior, 2017). In this study, we apply the Theory of Planned Behavior (TPB) (Ajzen, 1991; 2012) as the conceptual base to investigate the connections between leadership and knowledge sharing in workgroups. The study specifies in a structural model how the behavior of leaders acts on the different constructs and processes defined by the TPB.

This study also contributes to the field of management by investigating the role of social identities in knowledge sharing. The literature on groups and information systems usage suggests that individual and collective ties vary in intensity and that a strong sense of belonging favors cohesion and adhesion to social norms and cooperation (DeSanctis & Poole, 1997; van Dick, Grojean, Christ, & Wieseke, 2006). Some studies have observed associations between identity ties and knowledge sharing in teams (Liu & Li, 2018). Authors who adopted the Knowledge-Based View in their studies (Carmeli, Atwater, & Levi, 2011; Kogut & Zander, 1996; Zhu, 2016) suggest that organizational identification facilitates communication and coordination and the learning of norms and procedures, thereby contributing to knowledge sharing and the generation of value. Therefore, besides leadership as a psychosocial factor, here we include organizational identification in the proposed model to analyze the role of these psychosocial antecedents together with the organizational antecedents previously discussed in the literature. Therefore, the study contributes to consolidate and integrate the critical psychosocial and organizational antecedents that enable the creation, exchange, and transformation of knowledge.

The proposed model was tested with data supplied by employees of the customer service area of a large Brazilian telecommunications company. Based on our analysis, we identified a parsimonious set of factors with a strong influence on the dynamics of sharing. The results can help improve programs and practices that aim to promote the diffusion of knowledge in groups and organizations.

KNOWLEDGE MANAGEMENT AND SHARING

The Resource-Based View (RBV) (Barney, 1991) proposes that the generation of competitive advantage is based on the resources developed and controlled by companies. According to Grant (1996), knowledge is the most relevant strategic resource of organizations. In contrast to financial, natural, and human resources, knowledge is intangible and has economic value that is hard to understand, classify, and measure.

Davenport and Prusak (1998), Probst, Raub and Romhart (2002), and Takeuchi and Nonaka (2008) all stress that knowledge is created and transmitted by the members of organizations by structured means, such as meetings, repositories of best practices, knowledge portals, coaching and mentoring. These authors claim that the creation of organizational knowledge should be understood as a process that augments the

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scope of the knowledge created by individuals and is crystallized at the group level by means of dialog, discussion, sharing of experiences and communities of practice.

Knowledge Management (KM) can be defined as a systematic and articulated intellectual process that aims to generate, store, share, and preserve organizational knowledge (Moreno & Santos, 2012; Murray & Peyrefitte, 2007) to generate competitive advantage (Stewart, 1998). According to Davenport and Prusak (1998), KM is meant to develop a culture that stimulates the search for, sharing and use of knowledge, and a set of systems, technologies, and networks of individuals that enable collaboration and exchange of experiences, information, and knowledge. Likewise, Takeuchi and Nonaka (2008) propose that organizations establish conditions and processes suitable for the development and diffusion of both explicit and tacit knowledge. They are based on four mechanisms: (1) socialization, with focus on sharing tacit knowledge; (2) externalization, with focus on transforming tacit into explicit knowledge; (3) combination, with focus on the association and application of explicit knowledge; and (4) internalization, with focus on the incorporation of explicit into tacit knowledge.

Studies about knowledge sharing generally touch on the movement of knowledge through the boundaries of specialized knowledge domains (Carlile & Rebentisch, 2003). Liyanage, Elhang, Ballal and Li (2009), for example, characterize knowledge sharing based on three underlying elements: the source (or origin) of knowledge; the destination (or receiver) of knowledge; and the mode or process by which it is shared. The concept of sharing thus goes beyond the individual level and is manifested at higher levels of analysis, such as groups, product lines, or departments (Argote & Ingram, 2000).

This study addresses knowledge sharing at the level of individuals. In this context, sharing can be understood as the face-to-face process by which people share their knowledge (Takeuchi & Nonaka, 2008). That process is crucial and inherent to the effective sharing of knowledge at higher levels of analysis.

DEVELOPMENT OF THE PROPOSED MODEL

The Theory of Planned Behavior (TPB) is a cognitive model of human behavior that seeks to understand and predict how individuals transform their intentions into behaviors (Ajzen, 1991; 2012). The model proposed in this article starts from the premises of the TPB. The central element of the Ajzen model is the behavioral intention, i.e., a person's motivation to behave in a certain way. It is defined as a precursor of specific human actions, reflecting positive attitudes about the behavior in question. Studies have indicated that the intention to behave in a certain way is the most influential element of behavior itself (Ajzen, 2012). Therefore, we propose that:

Hypothesis 1: the intention of individuals to share knowledge with peers positively influences their knowledge sharing behavior.

According to Ajzen (1991; 2012), subjective social norms influences the development of behavior intentions. Subjective norms are the beliefs of individuals that other persons in their social network want them to act in a certain way, i.e., their perception of the social pressures to behave or not to behave in that way. Empirical studies have validated the influence of subjective norms on the intention to engage in a wide range of behaviors, including the adoption of new technology, the realization of physical activities, and the use of condoms (Ajzen, 2012).

In a workplace where ongoing learning is valued, the members of the group or department share perceptions and expectations that learning is an essential part of the work routine and that knowledge is a central element, necessary and valued by reference groups, such as those composed of peers and superiors (Correia, 2013; Donato et al., 2017; Santos & Bastos, 2019; Sordi, Binotto, & Ruviaro, 2014; Tracey, Tannenbaum, & Kavanagh, 1995). Thus, in those settings, it can be assumed that the members of the relationship network of a person will tend to express the expectation that he/she will behave in line with these values, including by sharing knowledge with peers. These expectations thus constitute subjective norms associated with knowledge sharing behavior and can vary in intensity based on how much the social group values ongoing learning (Erden, Von Krogh, & Kim, 2012). Thus, we propose the following two hypotheses:

Hypothesis 2: the intensity with which a person's peers favor ongoing learning has a positive influence on that person's intention to share knowledge.

Hypothesis 3: the intensity with which a person's hierarchical superior is favorable to ongoing learning has a positive influence on that person's intention to share knowledge.

The attitudes about a behavior are a person's evaluations about a given action and its probable results (Ajzen, 1991; 2012). Attitude combines the interest in engaging in a determined behavior and the expected results, considering the subjective likelihood that the behavior will produce these results. The attitude regarding a behavior is an essential antecedent of the intention to act that way and materialize the behavior, including knowledge sharing (Bock, Zmud, Kim, & Lee, 2005; Erden et al., 2012; S.-S. Chen, Chuang, & Chen, 2012; Tonet & Paz, 2006). Therefore, we propose a fourth hypothesis:

Hypothesis 4: individuals' favorable attitude regarding knowledge sharing positively influences their intention to share their knowledge.

According to the TPB, the intention to engage in a behavior and the practice of the behavior itself are influenced by individuals' perception of behavioral control. Therefore, irrespective of how favorable people's attitudes are and the intensity of the subjective norms perceived by them, their intention to behave in a certain way, as well as the materialization of that conduct, are attenuated when they believe they do not have the resources or opportunities to act that way (Ajzen, 1991; 2012). In the organizational setting, two factors contribute to the formation of people's perception of behavioral control about knowledge sharing behavior: (1) the existence of opportunities during their working routine to share knowledge; and (2) the existence of a formal process to share knowledge with other individuals.

Von Krogh, Ichijo and Nonaka (2000) define enabling contexts as the shared spaces where social interactions happen that enable the occurrence of elements necessary for the processes of creation. The ideal setting is essential because the creation of knowledge has a fluid nature and occurs during opportunities for interaction between people. In line with the TPB, empirical studies indicate that the inclusion of opportunities to share knowledge in the workplace routine has a positive influence on the intention of individuals to share knowledge with their peers (Barbosa, Monteiro, & Freitas, 2012; Correia, 2013; Erden et al., 2012; Siemsen, Roth, &

Balasubramanian, 2008). In this context, the word Opportunity refers to the existence of channels and time that can be dedicated to knowledge sharing (Erden et al., 2012). Tonet and Paz (2006), however, point out that the opportunity needs to go beyond the act of knowledge sharing since it is also vital to clarify doubts and rectify knowledge conveyed previously that still deserves attention. Therefore, we propose two more hypotheses:

Hypothesis 5a: the existence of opportunities for knowledge sharing in the workplace is positively associated with individuals' intention to share their knowledge.

Hypothesis 5b: the existence of knowledge sharing opportunities in the workplace is positively associated with individuals' sharing of knowledge.

According to Durcikova and Gray (2009), the transparency of operational procedures is a function of their degree of formalization, documentation, detailing, periodic revision, standardization, and disclosure to all those involved. Formalized processes are more transparent and perceived as fairer by establishing clear expectations that invite the involvement of people and provide explanations for the development of activities and decisions. Hence, the existence of formalized processes for knowledge sharing between peers should enhance the perception of those involved that the appropriate means and resources are available to support knowledge sharing (Barbosa et al., 2012; Marjanovic & Freeze, 2012; Santos & Bastos, 2019; Sordi et al., 2014; Tonet & Paz, 2006). Thus, we propose the following hypotheses:

Hypothesis 6a: the existence of formalized operational processes and procedures for knowledge sharing in an organization has a positive influence on individuals' intention to share knowledge.

Hypothesis 6b: the existence of formalized operational processes and procedures for knowledge sharing in an organization has a positive influence on individuals' sharing of knowledge.

The proposed model integrates three psychosocial factors in the TPB that can influence the development of subjective norms and attitudes favorable to knowledge sharing at the individual level: (1) shared understanding;

(2) identification with the group; and (3) transformational leadership.

According to Nelson and Cooprider (1996) and Gerwin and Moffat (1997), shared understanding is measured by the degree to which the beliefs about work (e.g., norms, philosophy, problem resolution, and work experience) of a dyad are similar. Shared understanding is an a priori natural and evident understanding that confers organicity to a collectivity, keeping people united despite all the factors that may separate them. Empirical research has shown that similar heuristics and perspectives, along with shared experiences among peers, are important antecedents of knowledge sharing (Ghobadi, 2015; Hong & Vai, 2008; Rosenkranz, Vranešić, & Holten, 2014. Therefore, we propose that:

> **Hypothesis 7:** the perception of individuals that they share understanding with their peers positively influences their attitude toward knowledge sharing.

DeSanctis and Poole (1997) state that a "shared cognitive representation or a sense of collectivity" (p. 170) among the members of a group can produce a strong team identity by forging stronger ties. A strong and positive group identity acts as a force of attraction and promotes solidarity in a collectivity. Kang and Kim (2010) define identification with the group as a force that connects or attracts individuals to the group. When individuals have a strong identification with a group, the destiny of the group and its collective processes and results become important for their self-image, thus stimulating cooperation (Kane, 2010; Wachelke, 2013). Identification with the group should thus promote an attitude favorable to knowledge sharing (Sordi et al., 2014). Hence, we propose that:

> **Hypothesis 8:** the identification with the workgroup positively influences individuals' attitudes regarding knowledge sharing.

Recent studies have suggested that the leadership of workgroups has a relevant role in promoting knowledge sharing (Barbosa et al., 2012; Correia, 2013; Donato et al., 2017; Lee, Gillespie, Mann, & Wearing, 2010; Santos & Bastos, 2019; Tonet & Paz, 2006; Xue et al., 2011). Among contemporary leadership theories, the theory of transformational leadership has received the most attention and obtaind considerable empirical support in international studies (Gardner, Lowe, Moss, Mahoney, & Cogliser, 2010; Judge & Piccolo, 2004). Transformational leaders inspire the admiration of their followers and motivate them to attain collective goals and interests, by stimulating them intellectually and providing support for their needs (Bass & Riggio, 2005; Bass, 1985; Marotto, Roos, & Victor, 2007). Transformational leadership is associated with behaviors that transcend individual interests, such as collaboration and altruism (Cavazotte, Moreno, & Bernardo, 2013; Choi, 2009; Marotto et al., 2007), and organizational citizenship behavior among group members (Cho & Dansereau, 2010). The latter category includes knowledge sharing behaviors (LePine, Erez, & Johnson, 2002). Thus, we propose that:

> **Hypothesis 9:** transformational leadership has a positive influence on the attitudes of individuals regarding knowledge sharing.

The actions of transformational leaders are also essential to build an environment favorable to positive interactions and the existence of cooperative norms that are clearer and more widely shared (Chi & Huang, 2014; De Cremer & Van Knippenberg, 2002; H. Wang, Law, Hackett, Wang, & Chen, 2005). Carmeli, Atwater and Levi (2011) suggest that leadership can stimulate knowledge sharing by strengthening relational and organizational ties. Therefore, by creating strong esprit de corps in workgroups, transformational leaders fortify collective beliefs about the importance of knowledge sharing by the group and the leader. Hence, we propose that:

> **Hypothesis 10:** transformational leadership positively influences the subjective norms associated with individuals' peers related to knowledge sharing.

> **Hypothesis 11:** transformational leadership positively influences the subjective norms associated with individuals' hierarchical superior related to knowledge sharing.

Finally, transformational leadership has been associated with individuals' trust in their own ability to carry out specific actions, both by acquiring relevant competencies and through the provision by leaders of the means to perform tasks (Mannheim & Halamish, 2008). Therefore, transformational leadership can also promote more opportunities for sharing knowledge and eliminate barriers to this sharing. Hence, we formulated our last hypothesis:

Hypothesis 12: transformational leadership positively influences the opportunities for knowledge sharing perceived by individuals at work.

Figure 1 depicts the hypotheses of the proposed model. It includes three control variables: experience, education level, and sex.
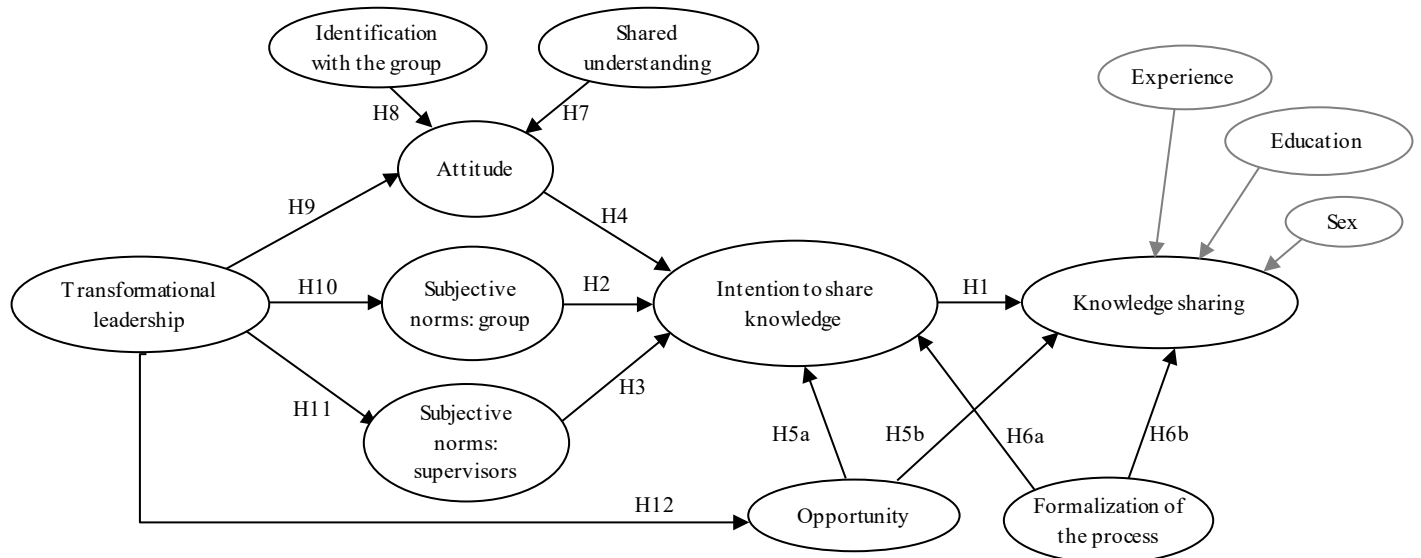

Figure 1. Proposed model.

RESEARCH METHOD

Operationalization of the constructs

Appendix 1 lists the ten scales used in this study. Below we describe their sources and adjustments made. The scales used to operationalize the constructs Knowledge Sharing, Intention to Share Knowledge, and Attitude were created by Ajzen (1985) and Davenport and Prusak (1998) and adapted to the context of knowledge sharing by I. Chen, Chen and Kinshuk (2009). To evaluate the Subjective Norms related to the knowledge sharing attributed to peers and hierarchical superiors, we used the two dimensions of the scale developed by Tracey, Tannenbaum and Kavanagh (1995) to evaluate people's beliefs about the emphasis on learning and knowledge in organizations.

In light of the role of context in the creation of knowledge (Von Krogh, Ichijo, & Nonaka, 2000), the perceived behavioral control construct related to Opportunity was measured with the scale of Moreno and Cavazotte (2015), adapted to the context of knowledge sharing. The instrument examines the existence of circumstances favorable to the acquisition and application of knowledge in the workplace. To evaluate the behavioral

control associated with a Formalized Process, we developed a specific metric, based on the scale developed by Durcikova and Gray (2009) to measure the construct Transparency of the Validation Process.

The Shared Understanding construct was measured with the original scale of Nelson and Cooprider (1996) and Gerwin and Moffat (1997), as adapted by Ko, Kirsch and King (2005), using only the items pertinent to knowledge sharing.

The Identification with the Group was measured with the scale adapted by van Knippenberg, Haslam and Platow (2007) for the group level, based on the work of Ashforth and Mael (1989).

To assess Transformational Leadership, we used the HSA-TFL questionnaire of Quijano, Navarro, Yepes, Berger and Romeo (2008), which assesses the perception of subordinates regarding the transformational qualities of their leaders/supervisors. This instrument is convergent with the Multifactorial Leadership Questionnaire (MLQ) of Bass (1985) (Berger, Yepes, Gómez-Benito, Quijano, & Brodbeck, 2011), but more succinct. We applied the version adopted by Carvalho (2012), translated into Portuguese.

The control variables (sex, education level, and experience) were measured by closed questions with alternatives corresponding to categories (e.g., male or female) or ordered categories (e.g., high-school, college, and graduate education).

Data collection

The data were collected through an electronic questionnaire sent to the employees of the customer service area of a large Brazilian mobile telecommunications company. At the time of the survey, the company had more than 70 million active lines and ten call centers throughout Brazil, six of them outsourced, staffed by around 10,000 employees. The study involved only those assigned to a unit of the company dedicated to interacting with high-value customers (people with the most expensive post-paid calls and data plans). This restriction was adopted to ensure there would be a reasonable demand for exchange of knowledge among peers, given the greater complexity of the job duties in comparison with employees serving the other customer segments. The participants in the study routinely use a large number of computational systems simultaneously for a single interaction (e.g., procedure system; post-paid and pre-paid billing systems; payment control system; customer loyalty system). The absence of a single integrated system and the diversity of demands from customers made their work specialized and complex.

After agreeing to participate in the study, the company's management provided the e-mail addresses of 470 call center employees, who were segmented into service cells. We sent them an invitation, explaining the objectives of the study, ensuring the confidentiality of the data collected, and describing the procedures involved. All told, 185 questionnaires were answered, of which 131 were filled in (response rate of 28%).

The demographic analysis of the sample revealed that 76% of the participants were women. Participants' ages were between 19 and 58 years (average of 31 and a standard deviation of 8 years). Regarding education level, 91% of the participants were high school graduates, and 9% had at least some college. These proportions did not have statistically significant differences in relation to all the call center employees.

RESULTS

The hypotheses proposed in this study were tested by structural equations modeling with the partial least squares (PLS) method. The statistical analyses were carried out with the SmartPLS 2.0 M3 software. The PLS method is robust to deviations from multivariate normality, permits the adequate treatment of formative and reflective constructs, and requires smaller sample sizes than the structural equations modeling techniques based on covariance (Chin, 2010; Hair, Hult, Ringle, & Sarstedt, 2014). Our sample was relatively small in relation to the number of parameters to be estimated and the analysis of the data revealed deviations with respect to the premise of multivariate normality.

According to Hair, Hult, Ringle and Sarstedt (2014), there is no single criterion to measure the quality of the estimates of a model (goodness of fit) when applying PLS. Therefore, we used nonparametric evaluation criteria based on bootstrapping and blindfolding. The former technique was applied to 1,000 samples of 131 cases to assess the significance of the estimated effects (Chin, 2010).

The quality of the measurement model was evaluated by confirmatory factor analysis (CFA). As suggested by Hair et al. (2014), items with loadings below 0.70 were eliminated, along with those that were strongly associated with the latent variables other than those of the same scale, generating values below that recommended for average variance extracted (AVE) and compound reliability (CR). After these adjustments, we performed a new CFA, whose results showed that all the items had suitable factor loadings in their respective variables, with statistical significance (p < 0.001), and were higher than 0.70.

Table 1 summarizes the overall results of the measurement model. The values of the average variance extracted (AVE), compound reliability (CR), and Cronbach's alpha (αc) were above the recommended thresholds, and the square root of the AVE for each variable was higher than the correlations of the respective latent variable with the other latent variables. These findings confirm the convergent and discriminant validity of the measurement model (Chin, 2010; Hair et al., 2014; Hair, Ringle, & Sarstedt, 2013).

Table 1. Results of the measurement model.

Latent Variables	Item	Mean	AVE	CR	α_C	Correlations									
						1	2	3	4	5	6	7	8	9	10
1. Attitude	4	4.50	0.78	0.93	0.90	**0.88**	-	-	-	-	-	-	-	-	-
2. Shared understanding	5	3.97	0.58	0.87	0.82	0.38	**0.76**	-	-	-	-	-	-	-	-
3. Group (subjective norms)	4	3.98	0.58	0.85	0.76	0.45	0.66	**0.76**	-	-	-	-	-	-	-
4. Identification with the group	3	4.21	0.72	0.88	0.80	0.46	0.37	0.46	**0.85**	-	-	-	-	-	-
5. Intention to share knowledge	4	4.47	0.66	0.89	0.83	0.65	0.35	0.45	0.51	**0.81**	-	-	-	-	-
6. Transformational leadership	14	3.98	0.73	0.97	0.97	0.29	0.19	0.26	0.21	0.26	**0.86**	-	-	-	-
7. Opportunity	3	3.15	0.83	0.93	0.90	0.18	0.19	0.27	0.20	0.15	0.38	**0.91**	-	-	-
8. Formalized processes	5	3.42	0.62	0.89	0.85	0.20	0.25	0.32	0.18	0.22	0.54	0.58	**0.79**	-	-
9. Supervisor (subjective norms)	6	3.49	0.61	0.90	0.87	0.21	0.21	0.43	0.30	0.21	0.64	0.44	0.55	**0.78**	-
10. Knowledge sharing	3	4.30	0.58	0.80	0.64	0.61	0.30	0.40	0.46	0.74	0.26	0.19	0.21	0.24	**0.76**

Note. The boldface values in the diagonal of the correlation table correspond to the square root of the average variance extracted (AVE).

Figure 2 presents the results of the structural model. The proportions of the variances of the constructs of interest explained by the model were substantial, except for those related to subjective norms associated with workgroups ($R^2 = 0.07$). The model was able to explain 47% of the variance observed for the intention to share knowledge and 58% of the variance observed for knowledge sharing. These results indicate that the model has adequate explanatory power.
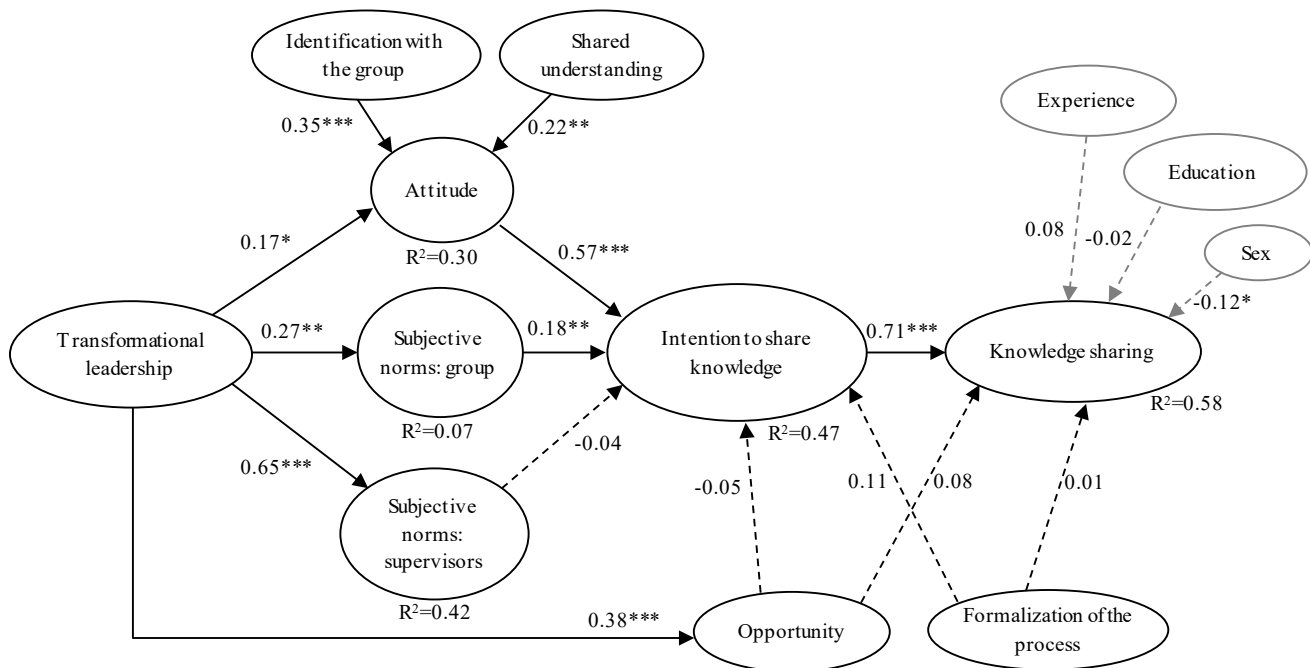

Figure 2. Results of the structural model.
$N = 131$; * p< 0,05; ** p<0,01; *** p<0,001.

Of the 14 hypotheses, nine obtained empirical support. Transformational Leadership of the direct supervisor of individuals had a strong influence on the exogenous constructs of the Theory of Planned Behavior, namely Attitude (H9), Subjective Norms of the group (H10) and supervisor (H11), and Perceived Behavioral Control (represented by the construct Opportunity) (H12). Likewise, Shared Understanding and Identification with the Group were significant determinants of the Attitude of individuals about knowledge sharing (H7 and H8, respectively). In turn, Attitude (H4) stood out among the antecedents of the Intention to Share Knowledge, presenting a direct effect three times stronger than Subjective Norms of the group (H2). Finally, as proposed by the TPB, Sharing Behavior was strongly influenced by the individuals' Intention to behave this way (H1).

Contrary to our expectation, none of the hypotheses associated with Behavioral Control were supported (H5a, H5b, H6a, H6b). The results also suggest that the Intention to Share Knowledge was not affected by the Subjective Norms associated with the direct supervisor (H3), only by those associated with the group (H2).

Only one of the control variables (Sex) had a statistically significant coefficient. This result suggests that, in the population we studied, women tend to transfer less knowledge to their peers than do men.

The total average effects calculated by the bootstrapping process (Table 2) indicated that the variables related to individuals' perceptions of their workgroups (Shared Understanding, Subjective Norms of the Group, and Identification with the Group) were the main determinants of their Intention to Share their Knowledge with peers. The Knowledge Sharing Behavior itself was influenced the most by people's Attitude, and through this by the mentioned factors.

Table 2. Total average effects obtained by bootstrapping.

Latent Variables	Sharing Intention		Sharing	
	Total effect	Standard error	Total effect	Standard error
Attitude	-	-	0.40***	0.10
Shared understanding	0.13*	0.05	0.09*	0.04
Group (subjective norms)	0.19**	0.07	0.13**	0.05
Identification with the group	0.20**	0.07	0.14*	0.06
Transformational leadership	0.10	0.09	0.11	0.06
Opportunity	-0.05	0.08	0.06	0.10
Formalized processes	0.12	0.09	0.09	0.07
Supervisor (subjective norms)	-0.04	0.08	-0.03	0.06

Note. The standard errors were calculated by the bootstrapping technique called Bias-Corrected and Accelerated (BCa), which aims to correct problems generated by bias and asymmetry of the distribution of the estimates (Chernick, M. R., & LaBudde, R. A. (2011). *An introduction to bootstrap methods with applications to R.* Hoboken, N.J: Wiley).

Since a single respondent performed the assessments of all variables in the proposed model, it is important to consider the possible existence of common method bias. To assess the presence of this bias, we used the Harmon one-factor test (Malhotra, Kim, & Patil, 2006; Patnayakuni, Rai, & Tiwana, 2007; Podsakoff & Organ, 1986). All the indicators of the latent variables were included in an exploratory factor analysis (EFA).

Nine factors with eigenvalues greater than 1.0 were identified, explaining 73.1% of the sample's variation. Since the first of these factors accounted for under 50% of this variation, it can be concluded that it is unlikely that the results were affected by common method bias.

CONCLUSION

The model proposed and evaluated here was formulated based on the Theory of Planned Behavior (TPB) (Ajzen, 1985; 1991; 2012) and extended to the context of knowledge sharing in the workplace. In the model, the central elements of the formation of behavioral intentions of the TPB (attitude, subjective norms, and behavioral control) were endogenous factors explained by exogenous psychosocial antecedents (identification with the group, shared understanding, transformational leadership). Besides this, two organizational factors (opportunity and formalized processes) were included as antecedents of the intention to share knowledge and the actual knowledge sharing behavior. Given the scarcity of empirical and quantitative studies about knowledge sharing at the individual level (Levine & Prietula, 2012), this study makes an important contribution by integrating psychosocial and organizational factors in the TPB and analyzing the relative importance to promote knowledge sharing in organizations.

The results confirm the proposed model's explanatory power. The model explained 58% of the variance of knowledge sharing behavior and 47% of the variance of intention to share knowledge in our sample. As suggested by Ajzen (2012), the intention to share knowledge was the factor with the most substantial influence on the realization of this behavior. It was also strongly influenced by individuals' attitudes toward sharing.

The integration of psychosocial factors in the TPB is a novel contribution of this study, by clarifying how elements associated with human interactions and the actions of supervisors can influence the motivation of individuals to share knowledge with their peers. In line with recent results (Ghobadi, 2015; Rosenkranz et al., 2014), the cognitive proximity among the group members, reflected in individuals' perception of shared understanding with their workgroup, was an essential element in the formation of attitudes favorable to knowledge sharing. Additionally, individuals with greater identification with their group tended to have more positive attitudes about sharing their knowledge (Kang & Kim, 2010). This attitude tended to be more positive when the direct supervisor had a more transformational leadership style.

The results also indicate that transformational leadership was associated with the subjective social norms attributed both to the workgroup and the direct supervisor, as well as the opportunities for knowledge sharing perceived by the participants. We found that leaders were crucial factors in the context studied. Their influence ranged from the development of a culture of knowledge exchange in the group and the diffusion of principles stimulating this exchange to the provision of opportunities through active management of the diffusion of knowledge within teams (Chi & Huang, 2014; Choi, 2009).

On the other hand, among the population studied, the social norms attributed to supervisors appeared not to be associated with individuals' attitudes toward sharing knowledge with their workgroups. This result might be a consequence of the routine of the respondents, who typically work in closer physical proximity with each other than to their hierarchical superiors. This situation likely stimulates more frequent and intense social interactions among the group members than between them and their direct supervisor. As a consequence, the subjective norms of the group have greater relevance to the formation of attitudes in favor of knowledge sharing among peers than those related to supervisors. Other empirical studies have suggested that attitudes about social entities closer to individuals (e.g., team vs. organization; peers vs. leaders) exert more influence on attitudes and behaviors that benefit workgroups (Becker, 2009), in line with the result found in this study. Future studies should analyze the relative importance of social norms associated with different entities, their influence on the members of organizations, and the conditions that determine their primacy.

The results also did not support the hypotheses relating behavioral control with the intention and behavior to share knowledge. A possible explanation is the participants' preference for the use of informal mechanisms for knowledge sharing. It might be that the means available in the organization are not sufficiently attractive for the participants to choose to use them when an opportunity arises. Another possibility

is that these means are not properly aligned with the formal opportunities and procedures for knowledge sharing. In the case of computational tools, difficulties of this type tend to reduce the perception of users of the ease of use and usefulness of the tools, diminishing their intention to engage in knowledge sharing (e.g., Venkatesh & Bala, 2008). Qualitative information obtained by us informally in conversations with employees and observations at the company suggest that various participants used extra-organizational social networks to share knowledge with their peers. In line with these results, recent studies have shown that the diffusion of new information technologies associated with the growing adoption of mobile devices favors the exchange of information in companies, in detriment to the formal structures provided by them (Davison, Ou, & Martinsons, 2013; Vaessen, Van Den Beemt, & De Laat, 2014). Besides this, in the case of tacit knowledge, sharing tends to happen via direct contact of individuals and socialization mechanisms that are often informal (Davison et al., 2013; Park, Vertinsky, & Becerra, 2015; Takeuchi & Nonaka, 2008). We, therefore, suggest that future studies be conducted to investigate the relationship between different formal and informal processes and means of knowledge sharing adopted by people in organizations. Such studies would be of great importance to companies that invest in Knowledge Management, especially since the protection of those assets is critical to obtaining a competitive advantage (Jean, Sinkovics, & Hiebaum, 2014; Lawson, Samson, & Roden, 2012).

The main limitation of this study is that the data were collected from a single company. Although it may raise issues regarding the generalizability of the results, this restriction allowed controlling for factors related to the working environment of the respondents, such as strategic guidance and objectives; organizational culture; internal policies, procedures and norms; access to training and consultation materials; and available infrastructure. Even though adequately measured, the inclusion of those factors in the proposed model would have required a much larger sample, which could have made the study impossible. We stress that the specific nature of the population considered in our study does not prevent the generalization of its results to similar contexts, i.e., to workgroups whose activities involve a reasonable level of operational complexity, relatively low educational level and specific training, and little formal interaction for the generation of expected individual results. Nevertheless, we recommend researching different organizational contexts, mainly in Brazilian companies, given the scarcity of quantitative studies of knowledge sharing among peers in the country.

The results point to the importance of social groups in the construction of workplaces that favor ongoing learning and knowledge sharing (Tracey et al., 1995). We thus suggest that firms that want to stimulate that behavior among their employees should invest in measures to strengthen the ties among members of work teams, while at the same time promoting sedimentation of shared values compatible with the generation, exchange, and application of knowledge. The development of leaders with a transformational style would be instrumental for this purpose. Organizations that succeed in this respect would be able to reap the benefits associated with the treatment of knowledge as an asset able to generate a sustainable competitive advantage (Grant, 1996).

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Authors' Contributions

1ˢᵗ author: responsible for designing the study, preparing the model, analyzing the data, and writing the article.

2ⁿᵈ author: participated in the literature review and theoretical model, data analysis, and article writing.

3ʳᵈ author: the work was based on his master's dissertation; was responsible for the literature review and data collection; participated in the writing of the work.

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APPENDIX 1. QUESTIONNAIRE SCALES

We discarded the items marked with an asterisk, as they had loads below 0.70 or were strongly associated with latent variables other than that of their scale in the confirmatory factor analysis (CFA).

Attitude:

ATD1 I believe that sharing knowledge with other members of my workgroup is useful for learning new knowledge.

ATD2 I believe that sharing knowledge with other members of my workgroup will help me to learn more efficiently.

ATD3 I believe that sharing knowledge with other members of my workgroup allows me to learn from more people.

ATD4 I believe that sharing knowledge with other members of my workgroup is useful to improve my learning performance.

Knowledge Sharing:

CON1 I dedicate considerable time to share my knowledge with the other members of my workgroup.

CON2 I actively share my knowledge with other members of my workgroup.

CON3 I usually get involved in discussions in my workgroup on various topics, without being restricted to specific issues.

CON4* I usually respond to other people's comments about my messages.

Shared Understanding:

ECO1 My workgroup and I agree on what is important.

ECO2 My workgroup and I have similar experiences in terms of customer service.

ECO3 My workgroup and I solve problems similarly.

ECO4 My workgroup and I understand each other.

ECO5 There are no difficulties in understanding between my workgroup and me.

Identification with the Group:

IDG1* When someone criticizes my organization (or my workgroup), it is as if they are criticizing me personally.

IDG2* I have a keen interest in knowing what others think of my organization (or my workgroup).

IDG3 When I refer to the organization (or my workgroup), I always say "we" instead of "them."

IDG4 For me, the success of this organization (or of my workgroup) is like a personal success.

IDG5 When someone praises the organization (or my workgroup), it is as if they are giving me a personal compliment.

Knowledge Sharing Intent:

INT1 I intend to share my ideas frequently with other members of my workgroup.

INT2 I always share my knowledge, at the request of other members of my workgroup.

INT3 I try to share my experiences (education or training) with the other members of my workgroup effectively.

INT4 I intend to share my way of solving problems with the other members of my workgroup to gain credit in the group.

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Transformational Leadership:

My boss or direct supervisor:

LTF1   uses different ways to motivate me.

LTF2   is a facilitator of my work.

LTF3   is accessible and receptive to my opinions, suggestions, and criticisms.

LTF4   guides and supports me in my work difficulties.

LTF5   tells me clearly what she/he expects from me (goals and responsibilities).

LTF6   periodically communicates to me what my job performance is and how I can improve it.

LFT7   acts as an "advisor" when the situation demands it.

LTF8   is concerned with developing/teaching those in need.

LTF9   advises those in need.

LTF10 makes us use reason and evidence to solve problems.

LTF11 encourages the use of intelligence to overcome obstacles.

LTF12 presents things in a perspective that stimulates me.

LTF13 I trust my boss/supervisor's ability to overcome any obstacles.

LTF14 I am proud to work with her/him.

Subjective Norms (Group):

NSG1   My coworkers exchange information and tips that are useful to improve their job performance.

NSG2   My coworkers suggest new approaches to solving problems, based on their own experiences.

NSG3   My coworkers are open to new ideas.

NSG4   My coworkers encourage each other to use new knowledge and skills in their activities at the organization.

Subjective Norms (Supervisors):

NSS1   Supervisors recognize and give credit to those who apply new knowledge and skills at work.

NSS2   The company's performance evaluation system associates financial rewards with the employees' technical competence.

NSS3   Independent and innovative thinking is encouraged by supervisors.

NSS4   The tasks involve free time to explore new ideas and advanced methods that may generate performance improvements.

NSS5   Supervisors ask for new ideas to solve work-related problems.

NSS6   Supervisors regularly express their support for continuous learning in the company.

Opportunity:

OPT1   I have the opportunity throughout the day to pass on knowledge to my peers.

OPT2   My work routine allows me to transfer knowledge to my colleagues.

OPT3   I have enough time to pass on knowledge to my colleagues.

Formalized Process:

PFO1   There are formal procedures for the exchange of knowledge in the company.

PFO2   The company's knowledge sharing procedures are well documented.

PFO3   You must follow a sequence of steps predefined by the company when you want to pass on knowledge to other people.

PFO4   My company defines clear roles and procedures for the exchange of knowledge between employees.

PFO5   The company's knowledge exchange procedures are widely publicized to employees.