

Gagné Marylène (Orcid ID: 0000-0003-3248-8947)

**Different motivations for knowledge sharing and hiding: The role of motivating work  
design**

Marylène Gagné

Curtin University

Amy Wei Tian

Curtin University

Christine Soo

University of Western Australia

Bo Zhang

School of economics and management, Beijing University of Chemical Technology

Khee Seng Benjamin Ho

Great Place to Work Institute

Katrina Hosszu

Curtin University

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1002/job.2364

## Author Note

Marylène Gagné, Future of Work Institute, Curtin University. Amy Tian, School of Management, Curtin University. Christine Soo, Management and Organisations Discipline, University of Western Australia Business School. Bo Zhang, College of Business Administration, Capital University of Economics and Business, Beijing, China. Khee Seng Benjamin Ho, Great Place to Work, Singapore. Katrina Hosszu, Future of Work Institute, Curtin University.

This project was funded through a University of Western Australia Business School Research Development Award to the first three authors, and a National Natural Science Foundation of China (NSFC71702116) to the second and fourth authors.

Correspondence concerning this manuscript may be addressed to Marylène Gagné, Future of Work Institute, Curtin University, GPO Box U1987, Perth, WA, 6845, Australia. [Marylene.gagne@curtin.edu.au](mailto:Marylene.gagne@curtin.edu.au).

## Author Biographies

Marylène Gagné (PhD University of Rochester) is Professor of organizational behavior at the Future of Work Institute, Curtin University in Perth Australia. Her research examines how job design, management and compensation affect people's motivational orientations towards their work. She also examines the consequences of these orientations for individual and organisational performance, and for individual mental health.

Amy Tian (PhD Cardiff University) is Associate Professor in human resource management at the Curtin Business School in Perth Australia. Her research focuses on three primary domains: 1) Multilevel Strategic HRM, 2) Strategic HRM and knowledge management, and 3) Strategic HRM and multiculturalism at work.

Christine Soo (PhD University of New South Wales) is Lecturer in strategic human resource management at the UWA Business School in Perth Australia. Her research focuses on how people create, share and apply knowledge in organisations, and the role of the organisation in implementing effective processes and mechanisms to facilitate this.

Bo Zhang is Lecturer in human resources management at the College of Business Administration of the Capital University of Economics and Business in Beijing, China. His research focuses on the effects of human resource management practices on employee outcomes and organizational performance.

Khee Seng Benjamin Ho (Master in IO Psychology, University of Western Australia) is an organizational development and personnel psychologist, and management consultant, at Great Place to Work in Singapore, where he provides workplace culture advisory services. He also has experience in workforce analytics and talent management.

Katrina Hosszu (Master in IO Psychology, University of Western Australia) is a research officer at the Future of Work Institute, Curtin University in Perth, Australia. She has an interest in high performance work teams and is currently conducting research on applied human factors and human systems integration in the design of highly complex socio-technical systems.

### Abstract

Little research to date has focused on understanding employee motivation to share and hide knowledge. Using self-determination theory, we tested the premise that knowledge sharing and hiding might be differentially motivated and that work design characteristics might influence the motivation to share knowledge with colleagues. In a panel survey of Australian knowledge workers and in a Chinese knowledge-intensive organization, we asked knowledge workers, using time-lagged designs, about perceptions of work design, motivation to share knowledge, and self-reported knowledge sharing and hiding behaviors. Results, largely replicated across both samples, indicated that cognitive job demands and job autonomy were positively related to future reports of knowledge sharing frequency and usefulness via autonomous motivation to share knowledge. Unexpectedly, task interdependence was positively related to the three forms of knowledge hiding (evasive and rationalized hiding, and playing dumb) via external regulation to share knowledge. Implications for the design of jobs that motivate knowledge sharing and demotivate knowledge hiding are discussed.

*Keywords:* knowledge sharing, knowledge hiding, motivation, work design

Today's organizations can gain competitive advantage from effective knowledge management and organizational learning (Collins & Smith, 2006; Riege, 2005) as jobs are becoming more complex and require problem solving and innovative thinking (Parker, 2014). Knowledge management in organizations depends heavily on employee behaviors, such as how they acquire, store, process, and transmit knowledge within the organization (Cabrera, Collins, & Salgado, 2006; Park, Ribiere, & Schulte, 2004). Empirical studies have demonstrated that knowledge sharing between employees is related to firm innovation capability (e.g., new product development) across industries and cultures (Camelo-Ordaz, Garcia-Cruz, Sousa-Ginel & Valle-Cabrera, 2011; Lin, 2007).

Knowledge sharing is the "act of making knowledge available to others within the organisation" and "involves some conscious action on the part of the individual who possesses the knowledge" (Ipe, 2003, p. 341). Research has focused on two critical aspects of sharing: the frequency at which colleagues share knowledge and the quality or usefulness of the knowledge that is shared (Soo, Devinney & Midgley, 2004; Swift & Virick, 2013), both of which we take into account in the current research. Another perspective has enriched our understanding of knowledge sharing by attempting to better understand why people hide their knowledge. Knowledge hiding is "an intentional attempt by an individual to withhold or conceal knowledge that has been requested by another person" (Connelly, Zweig, Webster, & Trougakos, 2012, p. 65). Strategies to intentionally hide knowledge when solicited include being evasive (e.g., saying one will share but never doing it), playing dumb (i.e., pretending not to know something), and rationalizing (e.g., giving a reason for not sharing knowledge; Connelly et al., 2012), all of which are taken into account in the current research. Knowledge hiding is not simply the absence of sharing. People might not share knowledge because they are not aware of others' need for the knowledge (Connelly et al., 2012). Intentionally hiding

knowledge, on the other hand, is an active and motivated form of not sharing as it focuses specifically on instances where the actor is solicited for his or her knowledge by coworkers.

The literature on knowledge sharing and hiding invariably mentions the importance of people's motivations in the decision to share or hide knowledge (Siemsen, Balasubramanian, & Roth, 2007). However, Connelly and colleagues (2012) have argued that motivations for sharing and hiding are likely to be different. The research presented herein verifies this proposition by examining the different motives behind knowledge sharing versus knowledge hiding. Based on calls to deepen the study of knowledge sharing motivation, Gagné (2009) proposed a model based on self-determination theory (SDT; Deci & Ryan, 1985), in which it was proposed that types of motivation would differentially relate to personal decisions to share knowledge with colleagues at work. Connelly and colleagues (2012) similarly argue that people may have different motives to hide knowledge, while the social dilemma perspective (which puts people in a situation where they can individually profit from being selfish, but with community and resource costs) does acknowledge that people may simultaneously hold reasons to share (e.g., seeing the importance of it for the organization or for colleagues, or being rewarded for sharing) and not to share (e.g., losing power through holding unique knowledge; Cabrera & Cabrera, 2002; Cress, Kimmerle, & Hesse, 2006).

Responding to calls for research on the effect of different motivations on knowledge sharing (Gagné, 2009) and hiding (Connelly et al., 2012), we tested whether different reasons (motivations) influence knowledge sharing and knowledge hiding. Furthermore, in the Gagné (2009) model, it was argued that certain HR practices, such as motivating work design, would influence knowledge sharing motivation. In the research presented herein we examined the role of three job characteristics that are hypothesized to be particularly relevant to knowledge sharing and hiding, namely cognitive job demands, task interdependence, and job autonomy. These work characteristics are drawn out of the work of Morgeson and Humphrey (2006) that

respectively represent knowledge, social and task aspects of work that are likely to have positive effects on knowledge sharing motivation (Gagné, 2009). This research is the first attempt, to our knowledge, to test this part of the knowledge sharing motivation model proposed by Gagné (2009), and hence provides insight into how organizations can promote knowledge sharing and discourage knowledge hiding through motivating work design.

● This research aims to contribute to theoretical advancements in the field of knowledge management by incorporating knowledge from the motivation and work design literatures, and through expanding the application of SDT and work design theory to the field. While knowledge sharing and hiding are often viewed as opposite behaviors, we emphasize that knowledge sharing and hiding behaviors are motivated differentially (and mostly uncorrelated). That is, knowledge sharing and hiding can be relatively independent behaviors that might be enacted toward different people or toward the same people differently over time. It also aims to provide practical advice to organizations and managers by first comparing antecedents of knowledge sharing and hiding, which can serve as interventions to either promote more knowledge sharing behaviors (quantity and quality) or alternatively discourage different forms of knowledge hiding. Second, by considering recent work design theory (Morgeson & Humphrey, 2006) to look at work characteristics that are particularly relevant to knowledge sharing and hiding, and by using SDT to explain how they would influence knowledge sharing and hiding, this research can potentially assist organizations to better design jobs that would promote knowledge exchange. Third, by examining whether knowledge sharing and hiding are indeed differentially motivated, as was previously suggested but not tested (Connelly et al., 2012), and by doing so through using the full breadth of motivational regulations offered in SDT, this research offers important managerial insights in terms of promoting or devaluing specific types of motivation that encourage knowledge sharing and discourage knowledge hiding.

## **Knowledge Sharing Motivation**

SDT (Deci & Ryan, 1985; Ryan & Deci, 2017) proposes different reasons to engage in an activity, such as knowledge sharing, that reflect the degree of self-determination in a person. At its core, SDT proposes intrinsic motivation and different forms of extrinsic motivation that vary on the extent to which they are autonomously driven. In general, research shows that the more autonomous forms of motivation yield better behavioral and well-being outcomes than less autonomous forms of motivation (Ryan & Deci, 2017). This motivational framework has been used in research focusing on different behaviors at different levels of analysis (Vallerand, 1997), including the motivation for a whole job (Gagné et al., 2015) to the motivation towards specific work tasks (Fernet, 2011) and motivation at a daily level (Gagné et al., 2003). In the research presented herein, we focused on the different motivations to share and hide knowledge, a specific work-related behavior.

Intrinsic motivation, the most autonomous form of motivation, is defined as engaging in an activity out of enjoyment and interest. Since it is associated with high work performance and effort (Gagné et al., 2015), Gagné (2009) hypothesized that this type of motivation would yield high frequency of knowledge sharing, as intrinsically motivated people would tend to spontaneously talk about their work passionately, even when not solicited. This form of motivation would yield low levels of knowledge hiding for the same reason. Identified regulation, an autonomous extrinsic form of motivation, represents engagement in an activity out of personal meaning and perceived importance. Since it is also highly related to work performance and effort (Gagné et al., 2015), Gagné (2009) suggested that this type of motivation would also be related to knowledge sharing. Indeed, if an individual believed that sharing knowledge would facilitate the attainment of important organizational goals, he or she would be more likely to share knowledge. We add that this form of motivation would be negatively related to hiding, as identification would lead to high



levels of collaborative effort when it is seen to lead to organizational goal accomplishment.

Since intrinsic and identified motivations tend to be highly correlated, researchers often collapse them into an “autonomous” motivation construct (Ryan & Deci, 2017).

Previous studies have indicated that autonomous motivation would promote knowledge sharing. For example, people are more likely to exchange information when they enjoy sharing with others and when they are mastery oriented (which is related to intrinsic motivation) than when they are doing it for rewards or when they are performance oriented (close to external regulation, defined below; Llopis & Foss, 2016; Lou, Fang, Lin, & Peng, 2013; Poortvliet, Janssen, Van Yperen, & Van de Vliert, 2007; Rhee & Choi, 2016).

Commitment to the organization and to one’s team, which is also related to autonomous motivation (Gagné et al, 2008) is positively related to knowledge sharing (Swart, Kinnie, van Rossenberg, & Yalabik, 2014). Finally, time pressure and competitiveness, two factors that have been shown to decrease intrinsic motivation (Amabile, DeJong, & Lepper, 1976; Reeve & Deci, 1996), have been shown to relate to less knowledge sharing (Connelly, Ford, Turel, Gallupe, & Zweig, 2014). However, we found close to no research examining relations between autonomous motivation and related constructs with knowledge hiding. An exception was Rhee and Choi (2016), who found a positive relation between performance goal orientation and knowledge hiding. Therefore, we predict that:

*H1. Autonomous motivation to share knowledge is (a) positively related to knowledge sharing and (b) negatively related to knowledge hiding.*

Introjected regulation represents engagement in an activity out of ego-involvement. Since this type of motivation is typically weakly positively related to work performance and effort (Gagné et al., 2015), Gagné (2009) proposed that it would be associated with knowledge sharing only when it boosts one’s ego or public image (i.e., showing off, gaining status), therefore yielding sharing that may be irregular and not overly useful. We add that

introjection would not be associated with knowledge hiding in any particular way for the same reasons: it may depend on whether hiding versus sharing knowledge is likely to preserve or boost one's ego (e.g., being evasive or rationalizing while showing the requester one has the sought after knowledge). The link between ego-involvement and knowledge sharing/hiding has not been studied so far to our knowledge, and it may be difficult to capture the irregular or contingent nature of knowledge sharing/hiding without the use of event-sampling methodologies. Therefore, we do not predict any significant links between introjected regulation and knowledge sharing and hiding.

Finally, external regulation represents engaging in an activity in order to obtain a social (e.g., approval) or material (e.g., bonus) reward or to avoid a social (e.g., criticism) or material (e.g., job loss) punishment. Since this type of motivation is often weakly associated with work performance and effort (e.g., Gagné et al., 2015; Kuvaas et al., 2016), Gagné (2009) proposed that this type of motivation would be associated with minimally sanctioned sharing that would consequently be less frequent and of lower quality. Research so far has supported this by showing that external regulation was less positively associated with knowledge sharing than intrinsic motivation (Andreeva & Sergeeva, 2016). Zhao, Detlor and Connelly (2016) even found that it weakened the relation between intrinsic motivation and knowledge sharing attitudes and behaviors. However, they found that when enjoyment was low, external regulation did lead to increases in knowledge sharing. Relatedly, job insecurity and expected rewards have been linked to increased knowledge hiding (Serenko & Bontis, 2016; Wang, Lin, Li, & Lin, 2014). Moreover, when knowledge sharing is rewarded, externally regulated people are likely to share "pseudo-knowledge": knowledge that is not useful to their colleagues. This may be an attempt to get the reward without "losing" the benefits of holding unique knowledge (Cress et al., 2005). Cockrell and Stone (2010) examined the extent to which accountants in finance, insurance, and real-estate industries

(considered to emphasize and value financial goals and to pay for performance) shared pseudo-knowledge compared to accountants working in higher education (considered to emphasize and value service and to pay based on market value). They found that accountants in the former industries indeed shared more pseudo-knowledge than those in the latter, and that awareness of incentives to share knowledge changed their motivation to be more extrinsic, which was related to sharing pseudo-knowledge. External rewards have also been shown to negatively affect people's attitudes towards knowledge sharing (Bock, Lee, Zmud, & Kim, 2005; Zhao, Detlor, & Connelly, 2016), and for this reason have been deemed insufficient and even detrimental to the motivation to share knowledge by many (McDermott & O'Dell, 2001; O'Dell & Grayson, 1998; Tissen, Andriessen, & Deprez, 1998).

We add here that external regulation would also be associated with the greatest level of knowledge hiding. Indeed, externally regulated people are likely to "not bother" with sharing information and find ways to get out of it through evasive manoeuvres and pretending not to know if they think they can get away with it. This is likely exacerbated if they feel psychological ownership of, and territoriality over, the knowledge they hold (Peng, 2013). Therefore, unless there is heavy surveillance or highly negative consequences to not sharing, we anticipate that externally regulated people will hide their knowledge. We predict that:

*H2. External regulation to share knowledge is (a) negatively related to knowledge sharing and (b) positively related to knowledge hiding.*

### **Motivating Work design**

SDT proposes that autonomous motivation depends on the satisfaction of three psychological needs for competence, autonomy and relatedness (Gagné & Deci, 2005). Similarly, Gagné (2009) proposed that when these needs are met in a work environment, it may influence people's motivation to share knowledge with colleagues. In one study, the quality of relationship between co-workers (representing relatedness to others) was

negatively related to withholding knowledge from colleagues (Tsay, Lin, Yoon, & Huang, 2014), while in another study, ostracism was positively related to knowledge hiding, particularly with evasive hiding and playing dumb (Zhao, Xia, & He, 2016).

In Gagné's (2009) model, HR practices that affect the satisfaction of psychological needs, including work design, compensation systems, managerial styles, and training and development, should influence knowledge sharing motivation. A few studies have examined how HR practices influence knowledge sharing. For example, job autonomy has been related to intrinsic motivation to share knowledge, while rewards for sharing knowledge were related to external regulation (Andreeva & Sergeeva, 2016). Commitment-based HR practices and high involvement work practices have been related to knowledge sharing (Collins & Smith, 2006; Flinchbaum, Li, Luth, & Chadwick, 2016). In the current research, we explore the role of motivating work design characteristics in influencing autonomous motivation for knowledge sharing. As Foss, Minbaeva, Pedersen, and Reinholt (2009) stated, "work design matters to knowledge sharing for fundamentally motivational reasons" (p. 872). We acknowledge that some cross-sectional research, using the classic Hackman and Oldham (1980) job characteristics model, has already shown that skill variety, task identity and significance, feedback, and autonomy can influence either motivation to share knowledge (Foss et al., 2009; Foss, Pedersen, Reinholt-Fosgaard, & Stea, 2015) or actual knowledge sharing behaviors (Andreeva & Sergeeva, 2016; Foss et al., 2009; Patterson, Gellatly, Arazy, & Jang, 2007; Pee & Lee, 2015; Nesheim & Gressgard, 2014).

Our research focused on three job characteristics that use a more recent model of motivating work design (Morgeson & Humphrey, 2006). We chose task, knowledge, and social characteristics that would be particularly important for motivating knowledge sharing in knowledge intensive work: the cognitive demands of the job (a knowledge characteristic), how interdependent the work is (a social characteristic), and how much autonomy the job

affords (a task characteristic). The first job characteristic considered in the our research is cognitive job demands, defined as the extent to which the job requires solving complex problems and in terms of how much information needs to be processed (De Jonge & Dormann, 2006; Morgeson & Humphrey, 2006). More cognitively demanding work is likely to require more knowledge exchange between co-workers, and is likely to enhance feelings of competence through having the chance to exercise complex skills as well as feelings of autonomy through requiring more discretionary decision-making during problem-solving. The satisfaction of these needs is likely to foster the development of autonomous knowledge sharing motivation. Some research suggests that cognitive job demands constitute a social-organizational factor that contributes to promoting the creativity of knowledge workers (Dul, Ceylan, & Jaspers, 2011), though we found no research that specifically tested the role of cognitive demands for knowledge sharing or hiding.

*H3. Cognitive job demands are (a) indirectly positively related to knowledge sharing, and (b) indirectly negatively related to knowledge hiding, through their effect on autonomous motivation.*

The second is task interdependence, defined as the extent to which the work of some depends on the work of others, or the connectedness between co-workers' jobs (Morgeson & Humphrey, 2006). It has been argued that knowledge intensive work environments require more information exchange and should therefore create interdependence that encourages knowledge sharing (Cabrera & Cabrera, 2005; Sharma & Yetton, 2003). Interdependence has indeed been shown to increase cooperation in a laboratory study (Wageman & Baker, 1997), and been shown to buffer against the effect of self-serving leadership on knowledge hiding (Peng, Wang, & Chen, 2018). Because the present studies focused on workers' knowledge sharing and hiding behaviors with their coworkers, we narrowed down task interdependence to whether participants perceive that coworkers depend on them to get their work done,

labelled initiated task interdependence (Morgeson & Humphrey, 2006). Accordingly, we focused on how perceiving that others depend on us would influence knowledge sharing motivation. On the one hand, perceiving that others need us to accomplish their work may foster more social interactions between workers, which could enhance feelings of relatedness, but it could also create pressure between coworkers, consequently diminishing feelings of autonomy. So far, research has not focused much on initiated task interdependence. We found three studies that examined the role of received task interdependence (i.e., depending on colleagues to accomplish one's work; Morgeson & Humphrey, 2007). The first study found a negative relation between task interdependence and knowledge withholding (Tsay et al., 2014). The others found no relations (Černe, Hernaes, Dysvik, & Skerlavaj, 2017; Fong, Men, Luo, & Jia, 2018), but instead found that received task interdependence protected innovation and creativity against knowledge hiding.

*H4. Task interdependence is (a) indirectly positively related to knowledge sharing, and (b) indirectly negatively related to knowledge hiding, through its effect on autonomous motivation.*

The third is job autonomy, defined as having discretionary power to decide on task prioritization, work methods, using personal initiative, and making decisions on one's own (Morgeson & Humphrey, 2006). Job autonomy has been shown to increase intrinsic motivation (Foss et al., 2009; Gagné et al., 1997) and is likely to facilitate the internalization of the value of sharing knowledge in one's work through increasing feelings of autonomy and competence (i.e., the development of identified regulation; Ryan, 1995). Many studies have already established the importance of job autonomy for knowledge sharing intrinsic motivation and behavior (see Pee & Lee, 2015 for a review). For example studies have established direct effects of job autonomy (in combination with recognition for knowledge sharing and a positive knowledge sharing climate) on high identified and intrinsic motivation

(Foss et al., 2009; Foss et al., 2015), and actual knowledge sharing behaviors (Andreeva & Sergeeva, 2016; Llopis & Foss, 2016; Patterson, Gellatly, Arazy, & Jang, 2007, Pee & Lee, 2015; Nesheim & Gressgard, 2014). However, the one study we found that looked at job autonomy and knowledge hiding found no relation between them (Černe et al., 2017).

Instead, this study found that a combination of job autonomy and a mastery climate decreased the negative effect of hiding on innovative work behavior. We argue that high job autonomy, because it would affect satisfaction of the need for autonomy, would discourage knowledge hiding through its influence on autonomous motivation.

*H5. Job autonomy is (a) indirectly positively related to knowledge sharing, and (b) indirectly negatively related to knowledge hiding, through its effect on autonomous motivation.*

## **Overview of Empirical Studies**

We conducted two empirical studies to examine the proposed hypotheses, which are illustrated in Figure 1. In Study 1, we conducted a 3-month time-lagged survey using a heterogeneous sample of Australian full-time knowledge employees recruited through a panel platform. In Study 2, we conducted a replication study using a sample of knowledge employees from a Chinese publishing company using a 3-week time-lagged survey. This replication sample allowed us to verify if results hold up in a different country and more homogeneous sample of knowledge workers.

### **Study 1**

#### **Method**

**Participants and Procedure.** Participants were recruited through a panel service provider (PureProfile), in which participation was voluntary and the surveys completed online. PureProfile sent out the survey to registered participants who fit the following criteria: full time workers in Australia in a “knowledge” job including those in professional-



knowledge intensive firms (such as legal services, accountancy, management consultancy, and marketing services) and in technology-knowledge intensive firms where is there high use of scientific and technological knowledge (such as R&D services, engineering services, and computing services). A screening question was also included in the survey to ensure participants were engaged in knowledge work (i.e., working in professional-knowledge or technology-knowledge intensive firms). To provide a more rigorous test of our hypotheses, and to address issues around common method bias, data about predictors and mediators were collected three months prior to collecting data on knowledge sharing and hiding. In order to match Time 1 (T1) and Time 2 (T2) data, participants were assigned with a unique account ID to access the survey at both time points. Participants were paid AUD \$11.40 to complete the Time 1 survey and were paid AUD \$9.00 to complete the T2 survey.

At T1, 1394 participants meeting the screening criteria completed the survey and were re-invited to participate in the T2 survey. A total of 452 participants were matched across time points (32% retention rate). Through the demographic data provided, the matched data was screened to ensure participants were working within the same organisation as they were at time 1. Together, this resulted in the exclusion of 57 participants. A missing values analysis was conducted for each subscale used in the analysis at T1 and T2. Across these subscales, missing data was found to be MCAR (with no item exceeding 3% missing data). Therefore the expected maximization method was used to impute missing values.

The final sample consisted of 394 employees (50% males and 50% females). Based on T2 data, the largest age group was 35-49 (42.4%), followed by 20-34 (30.7%), with the smallest age group 50 + (26.9%). Most participants had received a tertiary education (38.6% bachelor's degree; 27.7% postgraduate degree), followed by a diploma or vocational qualification (19.8%), while the remaining had education levels Year 12 (9.9%) or below (4%). Occupations with the highest proportion of participants were information technology



(22.6%), followed by finance (11.2%), education (10.7%), administration (8.4%), and health (8.4%). The remaining 37.5% were in engineering, marketing, and legal professions.

**Measures.** The measures used in this study were adapted from existing validated scales. Cronbach's alpha are reported in Table 1.

**Job characteristics (Time 1).** We measured *job autonomy* using eight items adopted from Boon et al. (2011) that reflected participation (e.g., “my organization offers me the opportunity to participate in decision-making processes”) and autonomy (e.g., “my organisation offers me the opportunity to do my work in my own way”). *Initiated task interdependence* was measured using three items from Morgeson and Humphrey (2006) (e.g., “my job requires me to accomplish my job before others complete their job”). *Cognitive job demands* was measured using seven items from Morgeson and Humphrey (2006) reflecting the information processing demands of the job (e.g., “my job requires me to monitor a great deal of information”) and complex problem solving (e.g., “my job often involves dealing with problems that I have not met before”). All items were measured on a 1 (*strongly disagree*) to 5 (*strongly agree*) Likert scale.

**Knowledge sharing motivation (Time 1).** Items were adapted from Ryan and Connell (1989) on a 1 (*completely disagree*) to 7 (*completely agree*) Likert scale, with the stem “I share my knowledge with colleagues at work....” provided in the questionnaire. Two items measured *external regulation* (“because I risk losing my job if I don't share my knowledge” and “to avoid being criticized by others”), two items measured *introjected regulation* (“because sharing my knowledge makes me feel more important” and “because others will respect me more”), two items measured *identified regulation* (“because I think it is very important for me to share what I know with my colleagues” and “because it makes my team, unit or organization more successful, and this is very important to me”), and two items

measured *intrinsic motivation* (“because it is fun to talk about things I know” and “because I enjoy talking about things that I feel passionate about”).

**Knowledge sharing frequency (Time 2).** Five items adapted from Swift and Virick (2013) measured the frequency of self-reported knowledge sharing behaviour. Participants were asked to rate each statement in relation to how frequently they shared knowledge with their colleagues within the past three months (e.g., “share knowledge with your coworkers by showing them what to do”) on a 1 (*never*) to 7 (*always*) scale.

**Knowledge sharing usefulness (Time 2).** Four items adapted from Soo, Devinney and Midgley (2004) measured participants’ perceived usefulness of the knowledge that they share with their colleagues. Participants were asked to indicate the extent to which they agreed or disagreed with statements which described the usefulness of their knowledge shared and whether their colleagues applied the shared knowledge to their work (e.g., “I share useful knowledge with my coworkers”) on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

**Knowledge hiding (Time 2).** Measures were adopted from Connelly et al. (2012). Participants were asked to think about instances in the past 3 months when they were asked by their colleague to share knowledge, and answer questions for *evasive hiding* (four items, e.g., “agreed to help him/her but never really intended to”), *playing dumb* (four items, e.g., “pretended that I did not know the information”) and *rationalized hiding* (four items, e.g., “explained that I would like to tell him/her, but was not supposed to”), using a scale from 1 (*not at all*) to 7 (*to a very great extent*).

**Analytical Strategy.** We examined the adequacy of our measurement model and our hypotheses with exploratory structural equation modeling (ESEM, Asparouhov & Muthén, 2009; Marsh et al., 2014; Morin et al., 2013), using Mplus 7.4 (Muthén & Muthén, 2010). ESEM is an analytical approach that combines confirmatory factor analysis (CFA), exploratory factor analysis (EFA) and structural equation modeling (SEM) into a single

overarching framework. ESEM is superior to the independent cluster model (ICM) of CFA approach because (1) the latter forces cross-loadings between items and non-target factors to be zero, which typically fails to account for sources of construct-relevant psychometric multidimensionality, and might thus produce biased parameter estimates as a result (Morin et al., 2016), and (2) when cross loadings are not estimated, latent factor correlations end up being overestimated (Guay et al., 2014). ESEM allows for the simultaneous considerations of all cross-loadings in a single step and uses target rotation (i.e., targeting cross-loadings to be close to zero), which makes it fully confirmatory (Asparouhov & Muthén, 2009). The structural model included all direct paths from predictors to mediators and all direct paths from mediators to outcomes, as well as freely estimated correlations between the predictors and between the mediators. Indirect effects were tested via bootstrapping.

## Results

**Measurement Models Testing.** We first used ESEM to examine the adequacy of our three-factor work design, three-factor motivation, and two-factor knowledge outcome models separately. The three-factor work design model provided a reasonable fit to the data,  $\chi^2(102) = 434.35$ ,  $p < .001$ , CFI = .90, TLI = .85, RMSEA = .09, SRMR = .03, and significantly better fit than the alternative single-factor work design model,  $\chi^2(135) = 1103.38$ ,  $p < .001$ , CFI = .60, TLI = .55, RMSEA = .19, SRMR = .16. Moreover, most items loaded strongly on their respective work design factors (ranging from .61 to .89), whereas most cross-loadings were weaker (−.14 to .19). The two-factor knowledge outcome model for a single knowledge sharing and a single knowledge hiding factor did not fit the data well,  $\chi^2(169) = 1183.92$ ,  $p < .001$ , CFI = .84, TLI = .80, RMSEA = .12, SRMR = .05. Instead, a five-factor knowledge outcome model provided a better fit to the data,  $\chi^2(115) = 320.62$ ,  $p < .001$ , CFI = .97, TLI = .94, RMSEA = .07, SRMR = .02, with most items loading strongly on their respective factors (ranging from .40 to .97), and weaker cross-loadings (−.31 to .35). This model also fit

significantly better than a three-factor knowledge outcome model where all knowledge hiding dimensions were combined into a single knowledge hiding factor,  $\chi^2(150) = 906.81, p < .001$ , CFI = .88, TLI = .84, RMSEA = .11, SRMR = .03.

The three-factor motivation model provided a reasonable fit to the data,  $\chi^2(7) = 34.19, p < .001$ , CFI = .97, TLI = .88, RMSEA = .10, SRMR = .02, and was retained for hypothesis testing. Items loaded strongly on their respective factors with weaker cross-loadings. A three-factor model was justified because a four-factor model, differentiating identified and intrinsic motivation, indicated model convergence issues and revealed a correlation of  $r = .90, p < .001$ , between identified and intrinsic motivation latent factors. It was also justified over a two-factor model (autonomous and controlled motivation), where fit was equivalent to the three factor model,  $\chi^2(13) = 53.78, p < .001$ , CFI = .95, TLI = .90, RMSEA = .09, SRMR = .03, but yielded inadequate factor loadings. We performed a full measurement (with 11 latent factors) ESEM and obtained adequate fit,  $\chi^2(875) = 1730.70, p < .001$ , CFI = .94, TLI = .92, RMSEA = .05, SRMR = .04. This model was retained for hypothesis testing.

**Descriptive Statistics and Correlations.** Table 1 presents the means, standard deviations, latent inter-correlations, and coefficient alphas for the measured variables. All scales had acceptable internal reliabilities. In addition to autonomous motivation, we added correlations with identified regulation and with intrinsic motivation (non-latent) to provide additional information related to these two forms of motivation. These correlations show that both identified and intrinsic motivation were positively correlated with knowledge sharing frequency and usefulness, while only identified regulation was negatively related to the three forms of knowledge hiding. Autonomous motivation was positively correlated with knowledge sharing frequency and usefulness, and negatively correlated with all three dimensions of knowledge hiding. Introjected regulation was positively but rather weakly related to all three forms of knowledge hiding. External regulation was negatively correlated

with knowledge sharing usefulness, and positively correlated with all three dimensions of knowledge hiding. Finally, all three work design characteristics were positively related with autonomous motivation, but surprisingly, task interdependence was also positively related with external regulation. Job autonomy and cognitive job demands were positively related to knowledge sharing frequency and usefulness, and negatively related to all three forms of knowledge hiding, while task interdependence was unrelated to knowledge outcomes. These results offer preliminary support for many of the hypotheses.

**Testing of Hypotheses.** A structural model was tested using the ESEM measurement model tested above. All direct relations between predictors and mediators, and between mediators and outcomes were included, as well as correlations between predictors, correlations between mediators, and correlations between outcomes. Model fit was adequate,  $\chi^2(890) = 1805.63, p < .001, CFI = .93, TLI = .92, RMSEA = .05, SRMR = .05$ . Figure 1 presents the significant direct standardized path estimates. Results supported H1a and H1b, showing autonomous motivation was significantly and positively related to knowledge sharing frequency and usefulness, and significantly and negatively related to all three dimensions of knowledge hiding. As expected, introjected regulation was unrelated to either knowledge sharing or knowledge hiding. As shown in Figure 1, external regulation was significantly and positively related to all three dimensions of knowledge hiding, providing support to H2b. However, no support was found for H2a, as external regulation was not significantly related to knowledge sharing frequency and usefulness, even though the latter was negative and significant in the correlations.

To test H3 to H5, we tested the significance of the indirect effects via bootstrapping analysis. Providing support for H3a and H5a, autonomous motivation mediated the effect of cognitive job demands on knowledge sharing frequency,  $\beta = .28, p < .001$ , and usefulness,  $\beta = .27, p < .03$ , and the effect of job autonomy on knowledge sharing frequency,  $\beta = .12, p <$

.05. Providing support for H3b, autonomous motivation mediated the effect of cognitive job demands on all three dimensions of knowledge hiding: playing dumb,  $\beta = -.15, p < .05$ , evasive hiding,  $\beta = -.07, p < .05$ , and rationalized hiding,  $\beta = -.12, p < .05$ . Providing partial support for H5b, autonomous motivation mediated the effect of job autonomy on two dimensions of knowledge hiding: evasive hiding,  $\beta = -.07, p < .05$ , and rationalized hiding,  $\beta = -.05, p < .05$ .

No significant indirect effects of task interdependence on knowledge sharing and hiding outcomes via autonomous motivation emerged (therefore there was no support for H4a and H4b). However, while not expected, the results revealed that external regulation significantly mediated the effects of task interdependence on all three dimensions of knowledge hiding: playing dumb,  $\beta = .24, p < .05$ , evasive hiding,  $\beta = .21, p < .05$ , and rationalized hiding,  $\beta = .21, p < .05$ . Furthermore, external regulation mediated the effect of cognitive job demands on the rationalized hiding aspect of knowledge hiding,  $\beta = -.17, p < .05$ .

## Study 2

### Method

**Participants, Procedure, and Measures.** A randomly selected group of 550 employees (50% of the workforce) from the Beijing subsidiary of a large publishing company in China were invited to participate in two online surveys, three weeks apart. Employees occupied a range of jobs, including information system, operations, finance, human resources, marketing and sales, health and safety, administration, maintenance, and executive management. The same screening question as in Study 1 was used to ensure they were engaged in knowledge work. At T1, we obtained 195 responses (35% response rate) on job characteristics and motivation (using the same items from Study 1). Those who responded at T1 were asked to complete the T2 survey (containing the knowledge sharing and hiding items from Study 1), and we obtained 100% response rate. Measures were translated into Mandarin

using back-translation methods conducted by the second and fourth authors. We therefore used the matched data from those 195 participants for analyses. Participants were made up of 55.4% female, the largest age group was 20-34 (41.1%), followed by 50+ (33.8%), with the smallest age group 34-49 (24.1%). The largest organizational tenure group was 1-5 years (49.7%), followed by 6-10 years (16.4%). Many participants had received a tertiary education (44.1% bachelor's degree), followed by high school education (24.6%).

**Analytical Approach.** Due to the small sample size ( $n = 195$ ), we conducted path analysis with composites of study variables rather than latent variables, using Mplus 7.4 (Muthén & Muthén, 2010). Item scores were averaged to calculate a mean score for each of the variables. The path model included all direct paths from predictors to mediators and all direct paths from mediators to outcomes, as well as freely estimated correlations between the predictors and between the mediators, as well as freely estimated correlations between the predictors and between the mediators. Indirect effects were tested via bootstrapping.

## Results

**Descriptive Statistics and Correlations.** Table 2 reports descriptive statistics, correlations, and scale reliabilities. All internal reliabilities were above .70, except for introjected regulation. Correlations show, like in Study 1, that both identified and intrinsic motivation were positively correlated with knowledge sharing frequency and usefulness. However, unlike in Study 1, identified regulation was not correlated with knowledge hiding. Unlike in Study 1, introjected regulation was positively related to both knowledge sharing and hiding, and external regulation was positively related to knowledge frequency and with two forms of knowledge hiding (evasive and playing dumb). Surprisingly, the three job characteristics were positively related with all forms of motivation, and expectedly with knowledge sharing. Job autonomy was unrelated to knowledge hiding, while cognitive job demands were positively related to evasive hiding and playing dumb. Like in Study 1, task



interdependence was positively related to these two forms of knowledge hiding. These results offer preliminary support for about half of the hypotheses.

**Testing of Hypotheses.** We first tested a path model with all variables included, but model fit was inadequate,  $\chi^2(18) = 112.01, p < .001, CFI = .87, TLI = .62, RMSEA = .16, SRMR = .10$ . Because of the low internal reliability of introjected regulation and the lack of findings reported in Study 1 regarding the variable (supporting our null hypothesis), introjected regulation was removed for the model. Its removal significantly improved model fit,  $\chi^2(16) = 32.12, p < .001, CFI = .97, TLI = .93, RMSEA = .07, SRMR = .06$ . Figure 1 presents the significant direct standardized path estimates in parentheses.

Results supported H1a, showing autonomous motivation was significantly and positively related to knowledge sharing frequency and usefulness. However, no support was found for H1b, as autonomous motivation was not significantly related to any form of knowledge hiding. No support was found for H2a, with external regulation positively related to knowledge sharing frequency, contrary to expectations. Providing partial support for H2b, external regulation was significantly and positively related to evasive hiding and playing dumb. Results of indirect effect tests through bootstrapping provided support for H3a and H5a, showing autonomous motivation mediated the effect of cognitive job demands on knowledge sharing frequency,  $\beta = .17, p < .001$ , and usefulness,  $\beta = .19, p < .05$ , and the effect of job autonomy on knowledge sharing frequency,  $\beta = .26, p < .001$ , and usefulness,  $\beta = .28, p < .001$ . However, no support was found for H3b and H5b, as no significant indirect effects of cognitive job demands and job autonomy on knowledge hiding outcomes via autonomous motivation emerged. As in Study 1, no support was found for H4a and H4b, as task interdependence was not related to knowledge sharing or hiding via autonomous motivation. While not expected, results revealed that external regulation significantly mediated the effect of task interdependence on knowledge sharing usefulness,  $\beta = .09, p <$



.05, as well as the three dimensions of knowledge hiding: evasive hiding,  $\beta = .17, p < .05$ , playing dumb,  $\beta = .23, p < .001$ , and rationalized hiding,  $\beta = .21, p < .05$ .

## Discussion

The influence of different forms of motivation to share knowledge, as operationalized in SDT (Deci & Ryan, 1985), on knowledge sharing and hiding was assessed using two time-lagged correlational studies of knowledge workers from Australia and China. The role of work design was also examined. Using a differentiated five-factor model for the knowledge outcomes allowed us to explore whether the hypotheses hold for all forms of knowledge sharing and hiding. Given that past studies have often asked very general questions to assess knowledge sharing, such as being willing to share (e.g., Lou et al., 2013; Swart et al., 2014), our use of a differentiated measure of the frequency and perceived usefulness of shared knowledge (Soo et al., 2004) and a differentiated measure of knowledge hiding behaviors (Connelly et al., 2012) provided more nuanced results about the influence of work design and motivation on knowledge exchange dynamics.

### Theoretical Contributions

This research offers important theoretical contributions to the knowledge management field by integrating SDT and work design theory to investigate the impact of work design characteristics and different motivations on knowledge sharing and hiding. Results across the two studies were overall very similar, and supported the role that work design plays in influencing the motivation to share knowledge. In addition, the study demonstrates how knowledge sharing and hiding are differentially motivated.

**The role of work design.** We found that work design characteristics were related to knowledge sharing and hiding in both samples, and had their effects through motivation. As expected, cognitive job demands and job autonomy were indirectly positively related to knowledge sharing (in both samples) and negatively related to knowledge hiding (in the

Australian sample) via autonomous motivation. Interestingly, cognitive job demands were also indirectly negatively related to rationalized hiding via external regulation in the Australian sample. Thus, these work characteristics had the same effects across the samples on knowledge sharing, but only affected knowledge hiding in the Australian sample. As stated above regarding the potential cultural or organizational context influences on the results, it is possible that cognitive job demands translate into different reactions across cultural or organisational contexts, yielding different frequencies of knowledge hiding behaviors. Future research could explore cultural or organizational norms around knowledge hiding behaviors.

Unexpectedly, we found in both samples that even though it was positively related to both job autonomy and cognitive job demands, task interdependence was indirectly positively related to knowledge hiding via external regulation. Inspection of zero-order correlations indicates that this effect is genuine and not caused by a suppression effect. This may be because when one perceives that colleagues depend on us to accomplish their work, it creates a sense of pressure to share one's knowledge with colleagues, hampering feelings of autonomy in one's work. While we focused on initiated task interdependence (others relying on us), previous research has focused on received task interdependence (relying on colleagues to do one's job). It is possible that received task interdependence creates reciprocity, making people more willing to share knowledge and less likely to hide it. For example, Černe and colleagues (2017) found no relation between received task interdependence and knowledge hiding. On the other hand, initiated task interdependence may create a sense of pressure from colleagues to share information that promotes external regulation instead of autonomous motivation. Future research should examine more deeply whether and when task interdependence makes people feel pressured and how that pressure may influence knowledge hiding in particular.

Another plausible explanation is that high levels of task interdependence can generate untenable job demands that create excessive pressure, with the consequence that people prioritize task completion over knowledge sharing. It would be interesting to investigate this in future research, perhaps looking for moderators (e.g., time pressure or excessive workload), or examining different forms of interdependence (e.g., initiated versus received, reciprocal versus not), some of which have been assumed to promote knowledge sharing more than others (Sergeeva & Andreeva, 2016). Future research could use network methods to investigate these issues, examining interdependence and knowledge sharing at the dyadic and group level. Indeed, using such methods could allow for the examination of potential reciprocity issues between knowledge sharers (Connelly et al., 2012), such as those found when examining how knowledge hiding can trigger reciprocal distrust loops, which have been shown to cause drops in creativity (Černe, Nerstad, Dysvik, & Skelavaj, 2014).

Overall, our results indicate that knowledge, social, and task work characteristics that are of particular relevance to knowledge management (Morgeson & Humphrey, 2006) all influence knowledge sharing and hiding in some way through their effects on motivation. Results also complement research showing that other work factors, such as managerial support for knowledge sharing, a knowledge sharing climate, perceived competition in the workplace, and commitment-based versus transaction-based governance mechanisms, also influence sharing and hiding behaviors (Connelly & Kelloway, 2003; Connelly et al., 2014; Foss et al., 2015; Husted, Michailova, Minbaeva, & Pedersen, 2012). For example, our results showing differential motivations for knowledge sharing and hiding complement other results showing that a mastery climate (which tends to foster autonomous motivation) encourages feedback seeking between group members because it creates a space where learning and making mistakes (i.e., possibly appearing incompetent) is allowed, whereas when people are in a performance climate (which tends to foster a more external or

introjected orientation), members are more careful about what and whom they share with in order to maintain a positive image (Chadwick & Raver, 2015).

**The differential role of motivation.** Results indeed showed that autonomous motivation was positively related to both the frequency and perceived usefulness of knowledge sharing. Autonomous motivation was negatively related to the three forms of knowledge hiding only in the Australian sample. Through additional exploratory observations of correlations between identified and intrinsic motivation with the outcomes, we found that both were positively related to knowledge sharing in each of the samples, but that only identified motivation was negatively related to knowledge hiding and only in the Australian sample. Our studies stand in contrast to most of the research conducted so far on the motivation to share knowledge (see Pee & Lee, 2015, for a review), which has focused almost exclusively on intrinsic motivation and has not considered the difference between intrinsic motivation and identified regulation. Gagné & Deci (2005) emphasized the need to focus more on identified regulation as an important form of motivation in the work context, and the current research supports this assertion by demonstrating that it is as important to promote the internalization of the value of sharing knowledge as it is trying to increase people's interest and enjoyment in sharing their knowledge.

We also found, in both samples and as expected, that being externally regulated leads to more knowledge hiding (all three forms in the Australian sample, and two of the three forms in the Chinese sample). It is interesting to note that people with high external regulation are essentially saying that they share knowledge to be rewarded or not to get into trouble, yet they report high levels of hiding. This may mean that in their current job, sanctions for not sharing are not enforced properly or they are able to circumvent the rules by manoeuvring their way out through hiding tactics. At the same time, we found, contrary to expectations, in the Chinese sample that external regulation was positively related to frequency of knowledge

sharing though this effect was weaker than the one with autonomous motivation. This might possibly be because in this culture or organisational context, not frequently sharing knowledge brings about sanctions. It is interesting to note that though findings in the Chinese sample may appear at first to be contradictory (i.e., pressure leading to more frequent sharing and more hiding at the same time), it is possible that employees do either one or the other at different times and toward different targets depending on whether they can get away with it or not (as we used frequency scales). Future research could possibly use event sampling methodologies to look at these possibilities. It is also noteworthy that we did not find that knowledge shared out of external regulation was of lower reported usefulness, as was previously reported (Cockrell & Stone, 2010), though the zero-order correlation was significant and in the expected direction in the Australian sample. It would be good to further investigate the usefulness of knowledge shared under external regulation in future research, perhaps by asking knowledge requesters or recipients to report on the usefulness of the knowledge shared with them.

As expected, we found no effect of introjected regulation on knowledge sharing and hiding in the Australian sample. We were not able to include introjection in the China sample model test. However, when examining zero-order correlations in each sample, we find that introjection was positively related to both knowledge sharing (only in the Australian sample) and to knowledge hiding (in both samples). It would be important for future research to improve this subscale to be able to include it in future tests to ascertain its contribution to knowledge sharing and hiding, and particularly examine if this contribution differs across organisational and cultural contexts. We may possibly also find stronger effects for introjection by using event-sampling methods or daily reconstruction methods, which would allow the capture of knowledge sharing in cases when people think it will help enhance their own self-esteem or public image.

To summarize these findings, we found that knowledge sharing is motivated primarily through enjoyment and meaning (autonomous motivation) in both samples. On the other hand, knowledge hiding happened through both low autonomous motivation and high external regulation in the Australian sample, and through high external regulation in the Chinese sample. These results, combined with the fact that knowledge sharing and hiding measures were mostly uncorrelated (see Table 1), provide support for the idea that these behaviors are differentially motivated.

Overall, the research presented herein provides support for Gagné's (2009) knowledge sharing motivation model, showing that knowledge sharing motivation quality matters, and that job design can influence this motivation. It contributes to the empirical expansion of SDT and new knowledge on work design by applying these frameworks to the field of knowledge management. The hypotheses were tested in a rigorous manner through the use of two samples from different countries, using different recruitment methods (panel representing Australian employees from different organizations vs. recruitment in a single Chinese organization). We were able to replicate many of the results across the two samples. In particular, we replicated the unexpected and non-hypothesized finding that task interdependence is related to knowledge hiding via external regulation.

### **Practical Implications**

This research fulfilled its three practical aims by first providing advice on knowledge-relevant work design factors that can be used to create interventions around adjusting the cognitive demands and provisions of autonomy in jobs, and by carefully considering how to create interdependence between jobs without pushing people to engage in knowledge hiding behaviors. It provides a motivational explanation for the effects of work design on knowledge sharing and hiding, showing the benefit of promoting motivation through interest and meaning, which promotes sharing, instead of promoting motivation through pressure, which

promotes hiding. Thus, properly designing work to make it more stimulating and challenging, by allowing employees to process information and solve problems and by giving employees autonomy to make some decisions on their own or to participate in decision-making, is likely to enhance employees' autonomous motivation to share knowledge.

It would also be important to promote the internalization of the value of sharing knowledge (i.e., increasing identified regulation), which can be achieved through motivating work design, but also possibly through attending to leadership, incentive systems, and the development of knowledge sharing norms, which have all been shown to also influence knowledge sharing in previous research and proposed by Gagné (2009) to be important factors to consider. The research presented herein and the SDT framework offer an understanding of what promotes the internalization of the value of sharing knowledge through proposing that work-related factors that influence the satisfaction of needs for competence, autonomy, and relatedness are likely to foster knowledge sharing in organizations and to discourage knowledge hiding. Therefore, keeping in mind how any structure or practice may affect these needs can help guide their design.

Not only is it important to understand how to encourage knowledge sharing through proper organizational practices, but it is also important to understand other insidious negative consequences related to knowledge hiding. For example, Connelly and Zweig (2015) demonstrated that when colleagues engage in one or more of the three forms of knowledge hiding, others become less likely to share with them in the future, possibly damaging work relationships in a way that could cause organizational inefficiency.

### **Limitations and Future Research**

Future research would enhance our findings through the use of multiple sources of data to assess knowledge sharing and hiding, in particular reports from recipients of knowledge, perhaps using network analytic methods. In addition, since we did not consider the nature of

the knowledge shared by research participants, future research could verify if the sharing of tacit knowledge may be more dependent on autonomous types of motivation, such as identified regulation, than the sharing of explicit knowledge, as has been previously argued (Osterloh & Frey, 2000).

We considered more forms of motivation than previous research, using SDT's multidimensional conceptualization, and we adapted an oft-used scale (Ryan & Connell, 1989) to measure knowledge sharing motivation. Though the relations between motivation types and the different knowledge sharing and hiding sub-dimensions were essentially the same, future research may want to improve the motivation measure as we were unable to separate identified regulation and intrinsic motivation in either sample, and had reliability issues with introjected regulation in the Chinese sample. Improving the measure would allow for more stringent tests of Gagné's (2009) differential hypotheses regarding the two autonomous forms of sharing motivation. This research could look at why identified regulation (i.e., sharing out of perceived importance) would discourage knowledge hiding in some cases (Australian sample) and not others (Chinese sample). There might be cultural or organisation-specific reasons for these different findings.

Moreover, we did not assess people's feelings of autonomy, competence, and relatedness, which were assumed to be enhanced through work design and assumed to explain people's motivation to share knowledge. Future research could test this assumption. Bock and colleagues (2005), for example, demonstrated that a sense of affiliation with colleagues creates a climate conducive to knowledge sharing.

Our research methods were limited in using single-source data (i.e. reports from employees) through survey methods. This has been argued to increase the risk of common-method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), though it has been demonstrated that multivariate analyses including multiple predictors assessed with the same



method include a natural control for shared method variance, given that multivariate effects are estimated from each predictor's unique contribution (Siemsen, Roth, & Oliveira, 2010). We attempted to mitigate this potential risk by using time-lagged designs in both samples, separating antecedents and mediators from outcomes. Such a design also partially addresses causality issues by temporally ordering data collection for antecedents/mediators and outcomes. Additional verification through a single latent variable CFA test and through a bifactor model adding a general factors representing method variance to the measurement model (Podsakoff, MacKenzie, & Podsakoff, 2012) indicated no evidence of common method variance in Study 1 (sample size was insufficiently large to run the tests in Study 2). Nonetheless, the use of self-reported data did not allow us to verify agreement between senders and receivers of knowledge. Future research should therefore attempt to use longitudinal and quasi-experimental methods using multi-source data.

Finally, future research could extend our understanding of what adequately motivates knowledge sharing, while demotivating knowledge hiding, for example by looking at how compensation and incentive systems should be designed, how work teams and communities of practice should be set up, and how leadership influences knowledge sharing. We also showed that work design that encourages knowledge sharing is an important basis on which these other organizational and managerial factors will rest. If jobs are not properly designed in the first place to encourage and facilitate knowledge sharing, incentivizing and managing (through leadership) people's sharing behaviors might not have their intended effects. For example, a study found that sharing norms moderate the relation between incentives and knowledge sharing (Quigley, Tesluk, Locke, & Bartol, 2007). Differences in the effects of incentives (assumed to increase external regulation) on knowledge sharing, sometimes showing positive effects (Siemsen et al., 2007), sometimes negative effects (Brock et al., 2005; Gooderham et al., 2011; Lin, 2007), may also be explained by their interactions with

work characteristics and cultural values (Sergeeva & Andreeva, 2016), or by incentive characteristics (Gagné & Forest, 2008). For example, Foss and colleagues (2009) found that rewards only had positive effects on knowledge sharing when they were combined with high job autonomy.

### **Conclusion**

Two studies demonstrated that people may hold different types of motivation to share knowledge that have implications for their sharing and hiding behaviors. Knowledge sharing is mainly motivated through meaning and enjoyment. Hiding knowledge is encouraged through external pressures. This research also shows that work design influences these motives to share knowledge, particularly showing that job autonomy and cognitive job demands positively influence knowledge sharing and discourage knowledge hiding.

Surprisingly, when workers perceive that others rely on them to get their work done, it increases their external regulation to share knowledge, and this encourages knowledge hiding. Therefore, the design of jobs is important to consider when setting up a knowledge management system that will encourage the right kind of motivation to share knowledge. It is important to encourage the development of autonomous motivation to share knowledge over the development of external regulation through rewards and punishments. It is also important to consider both knowledge sharing and knowledge hiding behaviors to fully understand knowledge management dynamics in organizations. By showing that these behaviors are differentially motivated, this research demonstrates that knowledge hiding is not simply the opposite of knowledge sharing, but that these behavioral clusters each have their own dynamics.

## References

- Amabile, T. M., DeJong, W., & Lepper, M. R. (1976). Effects of externally imposed deadlines on subsequent intrinsic motivation. *Journal of Personality and Social Psychology, 34*, 92-98.
- Andreeva, T., & Sergeeva, A. (2016). The more the better... or is it? The contradictory effects of HR practices on knowledge-sharing motivation and behaviour. *Human Resource Management Journal, 26*, 151-171.
- Asparouhov, T., & Muthén, B. O. (2009). Exploratory structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal, 16* (3), 397-438.
- Bock, G.-W., Zmud, R. W., Kim, Y.-G., & Lee, J.-N. (2005). Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. *MIS Quarterly, 29*, 87–111.
- Boon, C., Den Hartog, D. N., Boselie, P., & Paauwe, J. (2011). The relationship between perceptions of HR practices and employee outcomes: examining the role of person–organisation and person–job fit. *International Journal of Human Resource Management, 22*, 138-162.
- Cabrera, A., & Cabrera, E. F. (2002). Knowledge-sharing dilemmas. *Organization Studies, 23*, 687–710.
- Cabrera, E. F., & Cabrera, A. (2005). Fostering knowledge sharing through people management practices. *International Journal of Human Resource Management, 16*, 720–735.
- Cabrera, A., Collins, W. C., & Salgado, J. F. (2006). Determinants of individual engagement in knowledge sharing. *International Journal of Human Resource Management, 17*, 245-264.

- Caligiuri, P. (2014). Many moving parts: Factors influencing the effectiveness of HRM practices designed to improve knowledge transfer within MNCs. *Journal of International Business Studies*, 45(1), 63-72.
- Camelo-Ordaz, C., García-Cruz, J., Sousa-Ginel, E., & Valle-Cabrera, R. (2011). The influence of human resource management on knowledge sharing and innovation in Spain: the mediating role of affective commitment. *International Journal of Human Resource Management*, 22, 1442-1463.
- Černe, M., Nerstad, C. G. L., Dysvik, A., & Skerlavaj, M. (2014). What goes around comes around: Knowledge hiding, perceived motivational climate, and creativity. *Academy of Management Journal*, 57, 172-192.
- Černe, M., Hernaus, T., Dysvik, A., & Skerlavaj, M. (2017). The role of multilevel synergistic interplay among team mastery climate, knowledge hiding, and job characteristics in stimulating innovative work behavior. *Human Resource Management Journal*, 27, 281-299.
- Chadwick, I. C., & Raver, J. L. (2015). Motivating Organizations to Learn: Goal Orientation and Its Influence on Organizational Learning. *Journal of Management*, 41, 957-986.
- Cockrell, R. C., & Stone, D. N. (2010). Industry culture influences pseudo-knowledge sharing: a multiple mediation analysis. *Journal of Knowledge Management*, 14, 841-857.
- Collins, C. J., & Smith, K. G. (2006). Knowledge exchange and combination: The role of human resource practices in the performance of high-technology firms. *Academy of Management Journal*, 49, 544-560.

- Connelly, C. E., Ford, D. P., Turel, O., Gallupe, B., & Zweig, D. (2014). "I'm busy (and competitive)!" Antecedents of knowledge sharing under pressure. *Knowledge Management Research and Practice*, 12, 74-85.
- Connelly, C. E., & Kelloway, E. K. (2003). Predictors of employees' perceptions of knowledge sharing culture. *Leadership and Organization Development Journal*, 24, 294-301.
- Connelly, C. E., Zweig, D., Webster, J., & Trougakos, J. P. (2012). Knowledge hiding in organizations. *Journal of Organizational Behavior*, 33, 64-88.
- Connelly, C. E., & Zweig, D. (2015). How perpetrators and targets construe knowledge hiding in organizations. *European Journal of Work and Organizational Psychology*, 24, 479-489.
- Cress, U., Barquero, B., Buder, J., & Hesse, F. W. (2005) Social dilemma in knowledge communication via shared databases. In R. Bromme, F. Hesse, & H. Spada (Eds.), *Barriers And Biases In Computer-mediated Knowledge Communication: And How They May Be Overcome* (pp. 143-167). Springer.
- Cress, U., Kimmerle, J., Hesse, F. W. (2006). Information exchange with shared databases as a social dilemma: The effect of metaknowledge, bonus systems, and costs. *Communication Research*, 33, 370-390.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- De Jonge, J., & Dormann, C. (2006). Stressors, resources, and strains at work: A longitudinal test of the Triple Match Principle. *Journal of Applied Psychology*, 91, 1359-1374.
- Dul, J., Ceylan, C., Jaspers, F. (2011). Knowledge workers' creativity and the role of the physical work environment. *Human Resource Management*, 50, 715-734.

- Fernet, C. (2011). Development and validation of the work role motivation scale for school principals (WRMS-SP). *Educational Administration Quarterly*, 47, 307–331.
- Flinchbaum, C., Li, P., Luth, M. T., & Chadwick, C. (2016). Team-level high involvement work practices: Investigating the role of knowledge sharing and perspective taking. *Human Resource Management Journal*, 26, 134-150.
- Fong, P. S. W., Men, C., Luo, J., & Jia, R. (2018). Knowledge hiding and team creativity: The contingent role of task interdependence. *Management Decision*, 56, 329-343.
- Foss, N., Minbaeva, D., Pedersen, T., & Reinholt, M. (2009). Encouraging knowledge sharing among employees: How job design matters. *Human Resource Management*, 48, 871-893.
- Foss, N. J., Pedersen, T., Reinholt-Fosgaard, M., & Stea, D. (2015). Why complementary HRM practices impact performance: The case of rewards, job design, and work climate in a knowledge-sharing context. *Human Resource Management*, 54, 955-976.
- Gagné, M. (2009). A model of knowledge sharing motivation. *Human Resource Management*, 48, 571-589.
- Gagné, M., Chemolli, E., Forest, J., & Koestner, R. (2008). The temporal relations between work motivation and organizational commitment. *Psychologica Belgica*, 48, 219-241.
- Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, 26, 331–363
- Gagné, M., & Forest, J. (2008). The study of compensation systems through the lens of self-determination theory: Reconciling 35 years of debate. *Canadian Psychology*, 49, 225-232.
- Gagné, M., Forest, J., Vansteenkiste, M., Crevier-Braud, L., Van den Broeck, A. et al. (2015). The Multidimensional Work Motivation Scale: Validation evidence in seven languages

and nine countries. *European Journal of Work and Organizational Psychology*, 24, 178-196.

Gagné, M., Ryan, R. M., & Bargmann, K. (2003). The Effects of Parent and Coach Autonomy Support on the Need Satisfaction and Well Being of Gymnasts. *Journal of Applied Sport Psychology*, 15, 372-390.

Gagné, M., Senécal, C., & Koestner, R. (1997). Proximal job characteristics, feelings of empowerment, and intrinsic motivation: A multidimensional model. *Journal of Applied Social Psychology*, 27, 1222-1240.

Gooderham, P., Minbaeva, D. B., & Pedersen, T. (2011). Governance mechanisms for the promotion of social capital for knowledge transfer in multinational corporations. *Journal of Management Studies*, 48, 123-150.

Guay, F., Morin, A. J., Litalien, D., Valois, P., & Vallerand, R. J. (2015). Application of exploratory structural equation modeling to evaluate the academic motivation scale. *The Journal of Experimental Education*, 83(1), 51-82.

Hackman, J. R., & Oldham, G. R. (1980). *Work redesign*. Reading, MA: Addison-Wesley.

Husted, K., Michailova, S., Minbaeva, D. B., & Pedersen, T. (2012) Knowledge-sharing hostility and governance mechanisms: An empirical test. *Journal of Knowledge Management*, 16, 754-773.

Ipe, M. (2003). Knowledge sharing in organizations: A conceptual framework. *HRM Development Review*, 2, 337-359.

Kuvaas, B., Buch, R., & Dysvik, A. (2012). Perceived training intensity and knowledge sharing: Sharing for intrinsic and prosocial reasons. *Human Resource Management*, 51, 167- 187.

- Kuvaas, B., Buch, R., Gagné, & Dysvik, A. (2016). Do you get what you pay for? Sales incentives and implications for motivation and changes in turnover intentions and work effort. *Motivation and Emotion, 40*, 667-680.
- Lin, H.-F. (2007a). Knowledge sharing and firm innovation capability: an empirical study. *International Journal of Manpower, 28*, 315-332
- Llopis, O., & Foss, N. J. (2016). Understanding the climate-knowledge sharing relation: The moderating roles of intrinsic motivation and job autonomy. *European Management Journal, 34*, 135-144.
- Lou, J., Fang, Y., Lim, K. H., & Peng, J. Z. (2012). Contributing high quantity and quality knowledge to online Q&A communities. *Journal of the American Society for Information Science and Technology, 64*, 356-371.
- Marsh, H. W., Morin, A. J., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual review of clinical psychology, 10*, 85-110.
- McDermott, R., & O'Dell, C. (2001). Overcoming culture barriers to sharing knowledge. *Journal of Knowledge Management, 5*, 76-85.
- Morgeson, F. P., & Humphrey, S. E. (2006). The work design questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology, 91*, 1321-1339.
- Morin, A. J., Arens, A. K., & Marsh, H. W. (2016). A bifactor exploratory structural equation modeling framework for the identification of distinct sources of construct-relevant psychometric multidimensionality. *Structural Equation Modeling: A Multidisciplinary Journal, 23*(1), 116-139.



- Morin, A. J., Marsh, H. W., Nagengast, B. (2013). Exploratory structural equation modeling: An introduction. In G. R. Hancock, R. O. Mueller (Eds.), *Structural Equation Modeling: A Second Course* (pp. 395-436), 2nd ed. Greenwich, CT: IAP.
- Muthén, L. K., & Muthén, B. O. (2010). *Mplus User's Guide, V. 6.1*. Los Angeles, CA: Muthén and Muthén, UCLA.
- Nesheim, T., & Gressgård, L. J. (2014). Knowledge sharing in a complex organization: Antecedents and safety effects. *Safety Science*, *62*, 28-36.
- O'Dell, C., & Grayson, C. J. (1998). If only we knew what we know: Identification and transfer of internal best practices. *California Management Review*, *40*, 154–174.
- Osterloh, M., & Frey, B. S. (2000). Motivation, knowledge transfer, and organizational forms. *Organization Science*, *11*, 538–550.
- Park, H., Ribiere, V., & Schulte, W. D. (2004). Critical attributes of organizational culture that promote knowledge management technology implementation success. *Journal of Knowledge Management*, *8*, 106–117.
- Parker, S. K. (2014). Beyond motivation: Job and work design for development, health, ambidexterity, and more. *Annual Review of Psychology*, *65*, 661-91.
- Patterson, R., Gellatly, I., Arazy, O., and & Jang, S. (2007). The effects of wiki characteristics on performance quality: The role of user motivations. *Proceedings of the Workshop on Information Technologies and Systems*, Volume 17.
- Pee, L. G., & Lee, J. (2015). Intrinsically motivating employees' online knowledge sharing: Understanding the effects of job design. *International Journal of Information Management*, *35*, 679-690.
- Peng, H. (2013). Why and when do people hide knowledge? *Journal of Knowledge Management*, *17*, 398-415.

- Peng, J., Wang, Z., & Chen, X. (2018). Does Self-Serving Leadership Hinder Team Creativity? A Moderated Dual-Path Model. *Journal of Business Ethics*. Advance Online Publication.
- Podsakoff, P., MacKenzie, S., Lee, J., & Podsakoff, N. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903.
- Podsakoff, P., MacKenzie, S., & Podsakoff, N. (2012). Sources of Method Bias in Social Science Research and Recommendations on How to Control It. *Annual Review of Psychology, 63*, 539-569.
- Poortvliet, P. M., Janssen, O., Van Yperen, N. W., & Van de Vliert, E. (2007). Achievement goals and interpersonal behavior: How mastery and performance goals shape information exchange. *Personality and Social Psychology Bulletin, 33*, 1435–1447.
- Quigley, N. R., Tesluck, P. E., Locke, E. A., & Bartol, K. M. (2007). A Multilevel Investigation of the Motivational Mechanisms Underlying Knowledge Sharing and Performance. *Organization Science, 18*, 71-88.
- Reeve, J., & Deci, E. L. (1996). Elements within the competitive situation that affect intrinsic motivation. *Personality and Social Psychology Bulletin, 22*, 24-33.
- Rhee, Y. W., & Choi, J. N. (2016). Knowledge management behavior and individual creativity: Goal orientations as antecedents and in-group social status as moderating contingency. *Journal of Organizational Behavior, 38*, 813-832.
- Riege, A. (2005). Three-dozen knowledge sharing barriers managers must consider. *Journal of Knowledge Management, 9*, 18–35.
- Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63*, 397-427.

- Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization. *Journal of Personality and Social Psychology*, 57, 749- 761.
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guildford Press: New York, NY.
- Serenko, A., & Bontis, N. (2016) Understanding counterproductive knowledge behavior: Antecedents and consequences of intra-organizational knowledge hiding. *Journal of Knowledge Management*, 20, 1199-1224.
- Sergeeva, A., & Andreeva, A. (2016). Knowledge sharing research: Bringing context back in. *Journal of Management Inquiry*, 25, 240-261.
- Sharma, R., & Yetton, P. (2003). The contingent effects of management support and task interdependence on successful information systems implementation. *MIS Quarterly*, 27, 533-556.
- Siemsen, E., Balasubramanian, S., & Roth, A. V. (2007). Incentives that induce task-related effort, helping, and knowledge sharing in workgroups. *Management Science*, 53, 1533-1550.
- Siemsen, E., Roth, A. V., & Oliveira, P. (2010). Common method bias in regression models with linear, quadratic, and interaction effects. *Organizational Research Methods*, 13, 456-476.
- Soo, C. W., T. M. Devinney and D. F. Midgley (2004). The role of knowledge quality in firm performance. In H. Tsoukas and N. Mylonopoulos (Eds.), *Organisations as knowledge systems*. London: Palgrave.
- Swart, J., Kinnie, N., van Rossenberg, Y., & Yalabik, Z. (2014). Why should I share my knowledge? A multiple foci of commitment perspective. *Human Resource Management Journal*, 24, 269-289.

- Swift, M. L., & Virick, M. (2013). Perceived support, knowledge tacitness, and provider knowledge sharing. *Group & Organization Management*, 38, 717-742.
- Tissen, R., Andriessen, D., & Deprez, L. F. (1998). *Value-based knowledge management: Creating the 21st century company: Knowledge intensive, people rich*. Amsterdam: Addison-Wesley Longman.
- Tsay, C. H.-H., Lin, T.-C., Yoon, J., & Huang, C.-C. (2014). Knowledge withholding intentions in teams: The roles of normative conformity, affective bonding, rational choice and social cognition. *Decision Support Systems*, 67, 53-65.
- Vallerand, R. J. 1997. Toward a hierarchical model of intrinsic and extrinsic motivation. *Advances in Experimental Social Psychology*, 29, 271-360.
- Wageman, R., & Baker, G. (1997). Incentives and cooperation: The joint effects of task and reward interdependence on group performance. *Journal of Organizational Behavior*, 18, 139-158.
- Wang, Y.-S., Lin, H.-H., Li, C.-R., & Lin, S.-J. (2014). What drives students' knowledge-withholding intention in management education? An empirical study in Taiwan. *Academy of Management Learning and Education*, 13, 547-568.
- Zhao, H., Xia, Q., He, P., Sheard, G., & Wan, P. (2016). Workplace ostracism and knowledge hiding in service organizations. *International Journal of Hospitality Management*, 59, 84-94.
- Zhao, L., Detlor, B., & Connelly, C. (2016). Sharing knowledge in social Q&A sites: The unintended consequences of extrinsic motivation. *Journal of Management Information Systems*, 33, 70-100.

Table 1

*Descriptive Statistics and Inter-Correlations for Study 1 Variables*

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Job autonomy	3.18	.89	(.94)											
2. Cognitive job demands	3.78	.68	.41***	(.88)										
3. Task interdependence	3.44	.83	.24***	.47***	(.78)									
4. External regulation	3.31	1.39	-.05	-.15	.35**	(.72)								
5. Introjected regulation	4.43	1.29	.26	.12	.06	.46***	(.77)							
6. Identified regulation	5.39	1.19	.40***	.58***	.36***	-.09	.48***	(.80)						
7. Intrinsic motivation	5.02	1.18	.43***	.51***	.25***	.10	.71***	.90***	(.78)					
8. Autonomous motivation	5.28	1.16	.43***	.59***	.29***	.01	.51***	-	-	(.86)				
9. Knowledge sharing frequency	5.05	.98	.22***	.32***	.14	-.10	.16	.49***	.46***	.50***	(.92)			
10. Knowledge sharing quality	5.40	.99	.22***	.33***	.09	-.22*	.09	.54***	.48***	.49***	.70***	(.91)		
11. Evasive hiding	2.52	1.59	-.09*	-.21***	.08	.52***	.26*	-.24***	-.05	-.18**	-.15**	-.33***	(.96)	
12. Playing dumb	2.35	1.54	-.12**	-.23***	.09	.54***	.22*	-.26***	-.09	-.22***	-.21***	-.37***	.83***	(.96)
13. Rationalized hiding	2.28	1.59	-.07	-.18***	.09	.50***	.27***	-.24***	-.05	-.13*	-.09	-.25***	.83***	.85*** (.96)

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Note.  $N = 394$ ; Scale reliabilities (Coefficient alpha) are on the diagonal. Scales range from 1 to 7, except for job characteristics (1 to 5);

Correlations are between latent variables except for identified and intrinsic motivation.

Table 2

*Descriptive Statistics and Inter-Correlations for Study 2 Variables*

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Job autonomy	3.92	.74	(.92)											
2. Cognitive job demands	3.70	.72	.52**	(.84)										
3. Task interdependence	3.29	.93	.34**	.63**	(.81)									
4. External regulation	3.18	1.78	.18*	.28**	.45**	(.74)								
5. Introjected regulation	4.58	1.60	.37**	.36**	.41**	.57**	(.50)							
6. Identified regulation	5.67	1.25	.48**	.41**	.21**	-.001	.42**	(.71)						
7. Intrinsic motivation	5.55	1.30	.44**	.33**	.19**	.13	.43**	.54**	(.87)					
8. Autonomous motivation	5.70	1.10	.52**	.43**	.23**	.02	.45**	.93**	.78**	(.88)				
9. Knowledge sharing frequency	5.26	1.14	.45**	.52**	.35**	.20**	.31**	.56**	.51**	.64**	(.91)			
10. Knowledge sharing quality	5.83	1.08	.48**	.43**	.28**	.09	.38**	.61**	.60**	.70**	.64**	(.94)		
11. Evasive hiding	2.55	1.55	.14	.18*	.25**	.36**	.17*	-.03	-.03	-.05	.06	-.04	(.87)	
12. Playing dumb	2.45	1.54	.14	.20**	.32**	.50**	.29**	-.01	-.04	-.05	.07	-.07	.82**	(.92)
13. Rationalized hiding	3.80	1.70	.07	-.01	.06	.13	.15*	.10	.01	.06	-.03	-.07	.47**	.48** (87)

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Note.  $N = 195$ ; Scale reliabilities (Coefficient alpha) are on the diagonal. Scales range from 1 to 7, except for job characteristics (1 to 5).

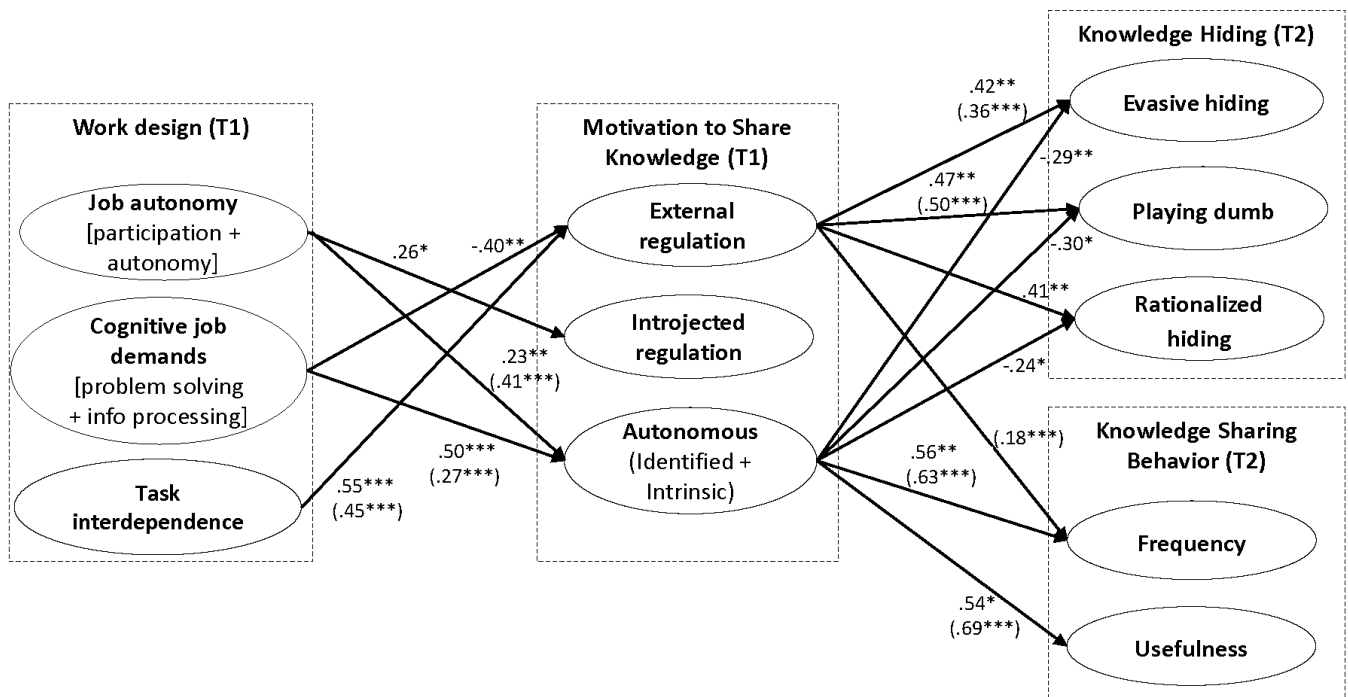


Figure 1. Results for Study 1 and Study 2

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Note. Only significant effects are shown in the Figure. Study 1 results are presented outside the parentheses, and Study 2 results are presented inside the parentheses.

Accepted