



**The mediating role of Knowledge Hiding in the Relationship  
between Psychological Safety Climate and Team Performance:  
A multi-level approach**

**Master thesis Human Resource Studies**

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### **Abstract**

Managing organizational knowledge effectively has become an important activity for many firms. Knowledge hiding among employees may hinder the efforts of promoting knowledge sharing and the development of new ideas. Drawing on social exchange theory, this study posits that under a strong psychological safety climate people tend to hide knowledge to a lesser degree, which in turn enhances team performance. A cross-sectional multilevel study including 171 employees nested in 36 groups revealed a negative relationship between psychological safety climate and knowledge hiding, as well as a positive relationship between psychological safety climate and team performance. However, the relationship between knowledge hiding and team performance was nearly in the threshold of significance, indicating that increased knowledge hiding leads to superior team performance. Therefore, the hypothesis was not supported. Theoretical and practical implications as well as recommendations for future research are discussed.

*Keywords: knowledge hiding, psychological safety climate, team performance, multilevel*

## Introduction

In the knowledge economy, organizational knowledge constitutes an important factor as the main source of competitive advantage (Spender & Grant, 1996; Teece, Pisano, & Shuen, 1997). Therefore, many organizations perceive knowledge management practices as an important part of their overall strategy, determining knowledge sharing as the most crucial component (Alavi & Leidner, 2001; Bouthillier & Shearer, 2002; Lee & Choi, 2003; Nahapiet & Ghoshal, 1998; Nonaka, Byosiere, Borucki, & Konno, 1994). Despite organizations' effort to increase knowledge sharing among their employees, many of them are hesitant to share their knowledge, since knowledge sharing engenders potential personal costs (Connelly & Zweig, 2015). For example, time, effort and loss of expert power are essential considerations for employees' hesitation to share their knowledge (Casimir, Lee, & Loon, 2012; Wasko & Faraj, 2000). Therefore, in numerous cases employees choose not to disclose their knowledge, engaging in so-called knowledge hiding (Connelly & Zweig, 2015; Connelly, Zweig, Webster, & Trougakos, 2012; Demirkasimoglu, 2015; Peng, 2013).

Connelly et al. (2012) argued that "knowledge hiding is not simply the absence of sharing; rather, knowledge hiding is the intentional attempt to withhold or conceal knowledge that has been requested by another individual" (p. 67). Research has emphasized the detrimental effects of knowledge hiding on social relationships (Connelly & Zweig, 2015), employee creativity (Bogilović, Černe, & Škerlavaj, 2017; Černe, Nerstad, Dysvik, & Škerlavaj, 2014) and team creativity (Bogilović et al., 2017). However, the impact of knowledge hiding on team performance is mostly unexplored. In qualitative research, Mangold (2017) demonstrated that knowledge hiding is a mechanism that not only enhances the knowledge hider's benefits but also intentionally hinders the knowledge seeker's performance. Nonetheless, an increased number of

employees work together in teams to achieve a common goal, which requires the exchange of knowledge or skills (Jackson, Chuang, Harden, & Jiang, 2006). Hence, if individuals hide knowledge that has been requested, although it is necessary as a means to succeed, team dynamics can be impaired (Staples & Webster, 2008). Consequently, team members are likely to face more negative interpersonal experiences, such as competition and distrust (Černe et al., 2014), that can hinder team performance. Although organizations cannot compel employees to disclose requested knowledge in an attempt to prevent the detrimental effects of knowledge hiding, they are still able to cultivate a work context that may diminish such behavior.

Research so far has paid little attention to contextual factors that could eliminate knowledge hiding, although studies in the knowledge hiding domain consistently argue that employees adjust their knowledge hiding behavior according to their surroundings (e.g., Connelly & Zweig, 2015; Connelly et al., 2012). A team-level climate has the potential to influence the team's interpersonal dynamic and provide stimuli for individuals to behave in a certain way (Johns, 2006; Parker et al., 2003). Psychological safety climate refers to team members' shared perceptions that the team is safe for interpersonal risk taking; reflecting whether team interpersonal and task relations are effectively managed by members (e.g., Bradley, Postlethwaite, Klotz, Hamdani, & Brown, 2012; Edmondson, 1999; Edmondson, Kramer, & Cook, 2004). Disclosing knowledge may generate risks for the sharer (Staples & Webster, 2008). Therefore team members, under psychological safety climate, are less likely to conceal requested knowledge, as they do not perceive disclosing knowledge to a co-worker as a threat to their own interests.

Edmondson (1999) and Kostopoulos and Bozionelos (2011) showed that team psychological safety stimulates team learning behavior, which in turn enhances team

performance. In the same vein, but under different foci, the present study proposes that knowledge hiding mediates the relationship between team psychological safety and team performance. In accordance with social exchange theory (Blau, 1964), psychological safety climate may initiate a social exchange in an employment relationship. Thus, employees are likely to reciprocate this cooperative climate to a colleague by sharing requested knowledge. In so doing, social exchange among employees strengthens and team members are likely to feel obligated to increase their effort towards team's goal, resulting in superior team performance. Since knowledge hiding depicts knowledge hider perspective, this variable will be studied on individual level. However, knowledge hiding refers to the dyadic interaction between employees, which can influence and be influenced by the social dynamics of the team that exchange partners belong. Therefore, psychological safety climate and team performance will be captured on team level.

The present study aims to make two main contributions to the knowledge hiding literature. Despite the growing consensus in the literature that knowledge hiding hinders team performance (Mangold, 2017; Peng, 2013; Zhao, Xia, He, Sheard, & Wan, 2016), the link is still unexplored. Knowledge hiding is likely to entail attempts at deception that can impair the team's social interactions (Connelly & Zweig, 2015; Connelly et al., 2012; De Geofroy & Evans, 2017), which in turn may result in inferior team performance. Therefore, the purpose of this study is to examine the relationship between knowledge hiding and team performance, potentially validating other authors' propositions. In addition, we offer new insights into a broader context, namely psychological safety climate, as a factor that may diminish knowledge hiding. Team-level climates, in the extant knowledge hiding literature, have mainly been examined as moderator factors in relation to knowledge hiding (e.g., Černe, Hernaus, Dysvik, & Škerlavaj,

2017; Černe et al., 2014) and have received little attention as antecedents of knowledge hiding (Connelly et al., 2012). However, in situations where people have to choose which course of action is the appropriate one (e.g., to hide knowledge or not), they reach a decision according to the extent of risk that this choice entails (Connelly & Zweig, 2015; Edmondson, 2003; Yagil & Luria, 2010). Hence, examining a team-level climate as an antecedent of knowledge hiding not only responds to the call for further multi-level approaches in studying knowledge hiding (Serenko & Bontis, 2016), but also advances our understanding of whether psychological safety climate can diminish knowledge hiding behavior.

### **Theoretical Framework**

#### **Psychological safety climate and Knowledge hiding**

Knowledge hiding captures dyadic interactions in which one employee requests a piece of knowledge by another employee, who intentionally hides that knowledge or merely chooses to only disclose a portion of that knowledge (Webster et al., 2008). Therefore, the relationship between these coworkers is likely to influence the way that the individual responds to a request for knowledge from the other (Connelly et al., 2012). Dyadic ties in organizations are largely regulated by an implicit social exchange between employees (Blau, 1964). Employee interactions based on dignity and respect will draw on norms of reciprocity and expectations of trust, honesty, and mutual aid (Buller & Burgoon, 1996).

Drawing on social exchange theory (Blau, 1964), the quality of interactions among employees in the past can influence the likelihood of an employee engaging in knowledge hiding. For example, employees that have received support from their coworkers may feel obliged to reciprocate by disclosing their knowledge. On the contrary, employees who have been treated poorly by some coworkers may feel entitled to hide knowledge from them.

Consequently, in order to disclose requested knowledge, employees need an organizational climate in which mutual trust and respect are prominent, so that the quality of their social interactions may increase. In addition, disclosing knowledge entails loss of control and increased risk (Staples & Webster, 2008). Therefore employees need to be encouraged to take risks and be comfortable with being vulnerable towards their colleagues. Psychological safety climate consists of the aforementioned characteristics and is defined as a shared belief that the team is safe for interpersonal risk taking (Edmondson, 1999). It reflects a team climate in which interpersonal trust and mutual respect are prominent and therefore benevolent actions will not lead to punishment (Edmondson, 1999).

Psychological safety implies more than just mutual trust among employees. Mayer, Davis, and Schoorman (1995) argue that the difference between trust and risk taking lies in the distinction between accepting to be vulnerable and actually becoming vulnerable. Hence, risk taking lies as the most proximal behavioral consequence or manifestation of trust (Mayer et al., 1995; Ross & LaCroix, 1996). Employees working under psychological safety climate are likely to participate in productive discussions that facilitate prevention of problems and accomplishment of shared objectives, since they are less likely to focus on self-protection (Edmondson, Kramer, & Cook, 2004). Therefore, employees are less likely to withhold knowledge, since they feel comfortable with being vulnerable to the actions of their colleagues. Psychological safety climate is characterized by mutual respect and trust, which strengthen the social exchange relationship between knowledge hider and knowledge seeker. Hence, it is less likely that an individual will conceal the knowledge that has been requested by the knowledge seeker. Thus, the above arguments suggest that psychological safety climate is likely to be related to lower knowledge hiding.

*Hypothesis 1: Psychological safety climate will be negatively associated with knowledge hiding.*

### **Knowledge hiding and team performance**

Team performance is the outcome of the collective effort of all team members (Katz-Navon & Erez, 2005; Wageman, 1995) and can be identified by the quantity and quality of work delivered by a team (Webber & Donahue, 2001). Salas, Cooke, and Rosen (2008), in an overview over the past 50 years of research on team performance, described teamwork as “the interdependent components of performance required to effectively coordinate the performance of multiple individuals” (p. 541). To enhance team performance, team members should be able to facilitate team processes, such as communication and coordination, in order to direct, align, and monitor teamwork (Marks, Mathieu, & Zaccaro, 2001). However, if team members consciously hide knowledge from their co-workers, team processes might be impaired, which may lead to inferior team performance. Knowledge hiding could stimulate a shift from a team perspective to a more narrow and individualistic focus, which can hinder employees’ communication and coordination, resulting in lower team performance.

Connelly and Zweig (2015) illustrated that knowledge hiding, when utilized deceptively among coworkers, harms employee relationships and could foster greater intentions to withhold knowledge in the future. In other words, knowledge hiding impairs the social exchange in employee relationships, as dishonesty between team members erodes the mutual trust that forms the foundation of employee relationships. Therefore, the communication between knowledge seeker and knowledge hider would suffer, which in turn could hinder team performance.

Furthermore, knowledge hiding might impair team coordination. Team coordination is dependent on transactive memory, which is described as the awareness of ‘who knows what’ in a team (Srivastava, Bartol, & Locke, 2006; Wegner, 1987). With the creation of transactive

memory, the team will be less likely to hide necessary knowledge to achieve team goals (Liu, Keller, & Shih, 2011) and thus, coordination can improve since employees can predict each other's behavior (Wittenbaum, Vaughan, & Strasser, 2002). In situations where an individual hide knowledge from a coworker, the latter is likely to start distrusting the knowledge hider. Subsequently the knowledge seeker will not know what behavior and information to anticipate from the knowledge hider. Due to the knowledge hiding that occurs in the team, team members will not be aware of 'who knows what' in the team, diminishing team coordination, which results in lower team performance.

In qualitative research, Mangold (2017) showed that employees are likely to hide knowledge from a co-worker in order to increase their own benefits and deliberately impede a co-worker's performance. Černe et al. (2014) supported that knowledge hiding impedes employee creativity via a distrust loop that arises when employees perceive co-workers as hiding knowledge. Building on this argument, Bogilović et al. (2017) argued that knowledge hiding hinders not only employee creativity but also team creativity. In addition, a recent study showed that knowledge hiding prevents higher levels of innovative work behavior (IWB) (Černe et al., 2017). In a nutshell, the distrust loop that is created due to knowledge hiding harms social exchange between the knowledge seeker and knowledge hider, which has detrimental effects at an individual and team level. Drawing on social exchange theory (Blau, 1964), when employee A hides knowledge from employee B, the latter is likely to reciprocate this behavior. Distrust that has been developed between them is likely to exacerbate the reciprocation of knowledge hiding by employee B towards employee A. Consequently, both employees' performance towards their common goal will be impaired and, in combination with decreased team communication and coordination, team performance will subsequently decrease. Therefore,

based on the above line of reasoning it is proposed that knowledge hiding is likely to be related to lower team performance.

*Hypothesis 2: Knowledge hiding will be negatively associated with team performance.*

### **Psychological safety climate and team performance**

Psychological safety climate has an impact on team processes and performance (Bradley et al., 2012; Burke, Stagl, Salas, Pierce, & Kendall, 2006; Edmondson, 1999; Koopmann, Lanaj, Wang, Zhou, & Shi, 2016) and therefore a direct association between psychological safety climate and team performance is expected as well. When psychological safety climate is in place, employees feel confident that their co-workers will not embarrass, reject or punish them for expressing their ideas (Edmondson, 1999). Therefore, they are more likely to experience a cooperative team atmosphere, which improves their social exchange relationships and provokes productive discussions and divergent perspectives (Hülshager, Anderson, & Salgado, 2009).

Psychological safety can facilitate a team to take appropriate actions to accomplish its task (Edmondson et al., 2004) as team members are more likely to contribute more ideas, participate in fruitful discussions about team processes and spend more time on productive problem solving since they spend less time on handling social interactions (Bradley et al., 2012). Based on the above arguments, authors have consistently supported the view that psychological safety climate increases team creative performance (Carmeli, Reiter-Palmon, & Ziv, 2010; Kessel, Kratzer, & Schultz, 2012; Shin & Eom, 2014), which primarily emphasizes the creation of valuable new products, services or ideas (Woodman, Sawyer, & Griffin, 1993). In a similar vein, psychological safety climate is likely to promote team performance as well, where the focus lies on the team's efficiency and overall achievement (Van Der Vegt & Bunderson, 2005),

as it may advance team members' social exchange relationships and team processes. Thus, the present study proposes that psychological safety climate is related to team performance.

*Hypothesis 3: psychological safety climate will be positively associated with team performance.*

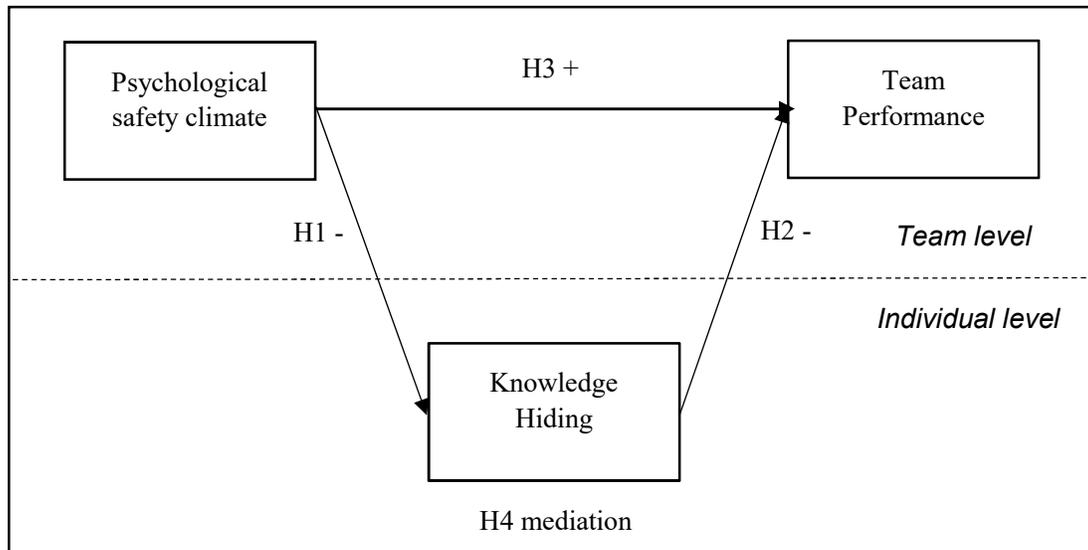
### **The mediating role of knowledge hiding**

Based on the aforementioned arguments, we suggest that there is a mediation between psychological safety climate and team performance via knowledge hiding, such that a higher psychological safety climate is related to less knowledge hiding, which in turn is related to higher team performance. According to Social Exchange Theory, trust is the key variable to the social exchanges (Blau, 1964). Cooperative behaviours are likely to enhance the level of trust between exchange colleagues potentially influencing future cooperation (Lambe, Wittmann, & Spekman, 2001). Employees under high levels of psychological safety climate have developed interpersonal relationships based on mutual trust and respect. Therefore, they are likely to feel obliged to reciprocate and thus not to hide knowledge, or to hide knowledge to a lesser extent. Furthermore, employees' increased level of knowledge hiding may trigger distrust that is likely to impair team communication and coordination as well as team members' social exchange relationship. Consequently, employees might feel compelled to retaliate to initial knowledge hiding by engaging themselves in knowledge hiding, which can hinder teamwork and eventually team performance.

Edmondson (1999) and Kostopoulos and Bozionelos (2011) supported the relationship between team psychological safety and team learning behavior, which in turn was associated to team performance. However, the line of reasoning of these authors was that psychological safety climate would enhance team learning behavior, such as searching and sharing knowledge, which in turn would increase team performance. The focus of the current study lies on the line of

argument that psychological safety climate decreases detrimental learning behavior, specifically knowledge hiding, which in turn will increase team performance. Thus, the fourth hypothesis is:

*Hypothesis 4: The relationship between psychological safety climate and team performance is mediated by knowledge hiding.*



*Figure 1. Conceptual model for the relationship between Psychological Safety Climate and Team Performance via Knowledge Hiding.*

## Methods

### Research design and Procedure

A quantitative cross-sectional research design was used to test the conceptual model presented in the theoretical framework. Data were previously gathered by nine Human Resource Studies Master's students of Tilburg University that were writing their master's thesis. Participants (a team of employees and their line managers) were selected by convenience sampling method based on the personal network of the master's students. However, to participate in this research, organizations had to meet specific criteria. The teams of employees were required to be composed of at least three team members and a line manager. In addition, the

organizations should comprise of at least 50 employees in total to ensure an established organizational climate. All the questionnaires were available in English or Dutch. Following a translation-back translation procedure (Brislin, 1986), the original English scales were translated into Dutch and then back to English. The questionnaires were distributed and collected digitally, via the online survey tool Qualtrics.

### **Sample**

The empirical data of the present study were collected from 171 employees and 36 line managers from 32 companies, operating in multiple work sectors. The average number of participants per team was 4.75, ranging from three to nine. Approximately 41.5 percent of the participants were male. The participants' average age was 37.73 years ( $SD= 10.99$ ) and their average organization tenure was 8.83 years ( $SD = 9.58$ ). The education level of the participants is as follows: primary school (1.8%), lower secondary education (4.7%), upper secondary education (33.9%), higher professional education (38%), University (21.6%).

The method of common latent factor was used to detect potential problems of common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The items were loaded on their theoretical constructs as well as on a latent factor, and the significance of the structural parameters was examined both with and without the latent factor in the model. The two models were not significantly different, as the largest difference of the standardized regression weights between the models was .056. Although a defined threshold for determining acceptable values does not exist, the recommended threshold is .20 (Gaskin, 2016). Thus, common method bias was not a pervasive problem in this study.

## Measures

This study used previously published scales to measure the constructs of psychological safety climate, knowledge hiding and team performance. A multi-level confirmatory factor analysis (MCFA) was conducted to test the construct validity and the reliability of the scales. Cronbach's alpha was used to estimate internal consistency. The variables were measured either at individual or team level. Specifically, psychological safety climate and knowledge hiding were assessed by the employees at individual level, yet psychological safety climate scores were subsequently aggregated to the team level. Team performance was assessed by the line managers at team level.

***Psychological safety climate.*** Employees' psychological safety climate was assessed using the seven-item scale developed by Edmondson (1999),  $\alpha=.84$ . A sample item is "If you make a mistake in this team, it is often held against you.". Items that were negatively stated were reversed in the scoring process in such a way that higher scores on the scale indicated greater psychological safety. All items were measured by a 7-point Likert scale ranging from "very inaccurate" to "very accurate". Employees' psychological safety climate ratings were aggregated to the team level to form the psychological safety climate measure of the team. The intraclass correlations (ICCs) and the multi-item within-group agreement ( $r_{wg(j)}$ ) were calculated to validate the aforementioned aggregation. The Excel file developed by Biemann, Cole, and Voelpel (2012) was used to calculate these numbers. For psychological safety climate,  $r_{wg(7)}$  ranged from .62 to .98 (a slightly skewed shape) with a mean of .87, ICC1 was .42 and ICC2 was .77 ( $F = 4.39, p < .000$ ). As stated by James (1982) the range of ICC1 is generally between 0 and .50, with a median of .12. The obtained values in the present study are above this median and indicate significant between-group variances in psychological climate. Nonetheless, there are no definite

guidelines for determining acceptable values. Although no critical cutoff exists for  $r_{wg(j)}$  estimates, the traditional heuristic cutoff proposed for aggregation is .70 (James, Demaree, & Wolf, 1984; Lance, Butts, & Michels, 2006). Given that all criteria were met, psychological safety climate was aggregated to the team level, as a perceived team climate depicts employees' shared perceptions and thus, an aggregated measure for climate may be the most suitable approach to study its relationship with knowledge hiding (Connelly et al., 2012).

***Knowledge hiding.*** Knowledge hiding was self-assessed with a 12-item scale developed by Connelly et al. (2012),  $\alpha=.92$ . The instructions asked participants to recall a recent situation in which a specific co-worker requested knowledge from them and they declined to share their knowledge or merely disclosed a certain part of that knowledge. An example item is: "I said that I did not know, even though I did". All items were measured by a 7-point Likert scale ranging from "not at all" to "to a very great extent".

***Team performance.*** Line managers provided ratings of team performance using a 5-item scale developed by Van Der Vegt and Bunderson (2005),  $\alpha=.91$ . The performance criteria were based on efficiency, quality, overall achievement, mission fulfilment and team productivity. Each line manager was asked to assess the performance of his or her team in comparison with the performance of teams that perform similar tasks. The response scale for these items was measured by using a 7-point Likert scale, ranging from "far below average" to "far above average".

***Control variables.*** Previous studies have indicated that individual demographics (e.g. age, organizational tenure) may influence employee's knowledge hiding behavior (Peng, 2013; Zhao et al., 2016). Hence, age and organizational tenure, measured in years, were regressed on knowledge hiding. In addition, given previous authors' (e.g., Liu et al., 2011; Van Der Vegt &

Bunderson, 2005) suggestions that team size can be related to team performance, perhaps influencing the cohesiveness and internal communication of the team, team size was included as well, as a control variable on team performance. Team size was transformed using  $\log_{10}$  to make variables' right-skewed distribution more normal.

## **Analysis**

The data were nested at two hierarchical levels: employees (level 1) and teams (level 2). The model was specified as a 2-1-2 model, and thus a multilevel analysis was conducted. To test the hypotheses, MSEM was applied, by using Mplus version 6.12 (Muthen & Muthén, 2010). Mplus was used because of its potential to estimate direct and indirect pathways simultaneously for multilevel models. The indirect effect was validated by bootstrap confidence intervals (MacKinnon, 2008).

Before conducting the analysis, the data were screened for outliers and missing values. The team size variable was the only one that had outliers and it was transformed using  $\log_{10}$  as already mentioned above. The gender, age, work tenure and education level variables had 10, 12, 10 and 9 missing values, respectively. To impute the missing values, a multivariate normal imputation model was implemented in the R 3.5.1 statistical language with *mice* package (Buuren & Groothuis-Oudshoorn, 2010). Specifically, a Bayesian linear regression model was applied for imputing age and work tenure, while a proportional odds model was applied for imputing gender and education level.

## **Results**

### **Descriptive statistics, validity and reliability**

The descriptive statistics of all included variables, as well as their correlations and reliability indexes were presented in Table 1. Model fit was evaluated by confirmatory factor

analysis using Mplus software, version 6.12. First, two separate CFAs were applied for the variables of psychological safety climate and knowledge hiding. The CFAs for psychological safety climate ( $\chi^2_{(14)} = 28.84$ , CFI = .97, TLI = .95, RMSEA = .08) and knowledge hiding ( $\chi^2_{(27)} = 35.15$ , CFI = .99, TLI = .98, RMSEA = .04) showed an acceptable fit. Second, a multi-level CFA was applied. The expected three-factor solution (psychological safety climate, knowledge hiding, and team performance) fit reasonably with the data ( $\chi^2 [88] = 139.84$ , CFI=.95, TLI=.92, RMSEA= .06). The SRMR values for the *within and between group* portion of the model were 0.03 and 0.03, respectively. The factor loadings ranged from .666 to .897 for the psychological safety climate items, .506 –.909 for the knowledge hiding items, and .765 -.880 for the team performance items. Although some factor loadings were rather low, no item was deleted to sustain the integrity of the scales.

Table 1  
Means, standards deviations and correlations

Variables	Mean	SD	Level 1 (Individual level)						Level 2 (team level)		
			1	2	3	4	5	6	1	2	3
<i>Level 1 (Individual level)</i>											
1. Psychological safety climate	5.29	1.06	(.84)								
2. Knowledge Hiding	1.57	.89	-.35**	(.92)							
3. Gender			-.22**	.15*	-						
4. Age	37.73	10.99	.00	-.15*	.02	-					
5. Organizational Tenure	8.83	9.58	-.04	-.01	.13	.71**	-				
6. Education			-.08	.05	-.10	.24**	.27**	-			
<i>Level 2 (team level)</i>											
1. Psychological safety climate	5.29	.77	.73**	-.23*	-.22**	-.03	-.05	-.10	(.93)		
2. Team performance	4.92	.92	.05	.13	.09	-.04	.09	-.161*	.06	(.91)	
3. Team size	1.28	.46	.03	.04	-.23**	.12	.07	-.21**	.05	-.26**	-

Notes. N=171 for the individual level, N = 36 for the team level. \*\*Correlation is significant at the .01 level (2-tailed)

\*Correlation is significant at the 0.05 level (2-tailed).

Coefficient alphas are given on the diagonal in parenthesis.

Psychological safety climate at level 1 represents employee perceptions, whereas at level 2 it represents aggregated scores at the team level.

### Multilevel analysis results

Multilevel analysis was conducted using Mplus software. The data had two hierarchical levels: 171 employees as level 1 and 36 teams as level 2. The results of the two-level (2-1-2) mediation model showed an acceptable fit ( $\chi^2(16) = 35.69$ , CFI = 1.00, TLI = 1.11, SRMR within = .00 SRMR between = .08). Therefore this model was used for further analysis.

Hypothesis 1 stated that psychological safety climate had a negative effect on knowledge hiding. Based on the results, this relationship was statistically significant ( $\gamma = -.24$ ,  $SE = .10$ ,  $p < .05$ ). Hypothesis 1 was therefore supported. Hypothesis 2 proposed that there was a negative relationship between knowledge hiding and team performance. However, the results showed that this relationship is positive and marginally significant ( $\gamma = 1.68$ ,  $SE = .87$ ,  $p = .053$ ). Nevertheless, we still opted not to accept the Hypothesis.

Hypothesis 3, that refers to the direct positive effect of psychological safety climate on team performance is supported by the data ( $\gamma = .62$ ,  $SE = .23$ ,  $p < .01$ ). Hypothesis 4 suggested that the relationship between psychological safety climate and team performance is mediated by knowledge hiding. Following the recommendation of Hayes (2009), the indirect effect was tested by a bootstrap confidence interval based on 1000 bootstrap samples. The results showed that the indirect effect was marginally significant ( $\gamma = -.41$ ,  $SE = .21$ ,  $p = .051$ , 95% bootstrap confidence intervals [-.821, .003]). Although the bootstrap confidence interval was not entirely below or above zero, it was below 0 at 90 % of bootstrap confidence intervals. Therefore, hypothesis 4 was not supported.

Table 2.

*Results multilevel analysis.*

Variable	Knowledge hiding			Team performance		
	Estimate	s.e.	p	Estimate	s.e.	p
Psychological safety climate	-.24*	.10	.010	.62**	.24	.008
Age	-.01	.01	.26			
Organizational tenure	.00	.02	.88			
Knowledge hiding				1.68	.87	.053
Mediating role of knowledge hiding				-.41	.21	.051
Team size				-0.55	.31	.08

*Notes.*  $N = 171$  for the individual level,  $N = 36$  for the team level. 99% bootstrap confidence interval [-.950, .132], 95% bootstrap confidence interval [-.821, .003], 90% bootstrap confidence interval [-.754, -.064].

## Discussion

Although knowledge hiding takes place frequently in organizations (Connelly et al., 2012), little is understood about the antecedents and consequences of this behavior. This study has drawn on social exchange theory (Blau, 1964) to support that high psychological safety climate is related to less knowledge hiding, which in turn is related to higher team performance. To study these effects, a quantitative cross-sectional multilevel research design was applied. The contextual factor of psychological safety climate significantly predicts knowledge hiding. That is, employees under a strong psychological safety climate were found to hide knowledge to a lesser extent. The direct effect of psychological safety climate on team performance was also supported, indicating that such a climate was found to have a positive impact on the overall performance of the team. The negative relationship between knowledge hiding and team performance was not supported. However, that relationship was nearly at the threshold of significance, implying that team members who instigated increased knowledge hiding incidents

were found to display superior team performance. The mediating role of knowledge hiding between psychological safety climate and team performance was not supported.

### **Theoretical contributions**

Although the construct of knowledge hiding is as old as the discipline of Knowledge Management itself (Davenport & Prusak, 1997, 1998), academic research has primarily emphasized the study of constructive knowledge behaviors, paying little attention on counterproductive knowledge behaviors such as knowledge hiding. This study makes 4 theoretical contributions to the literature on knowledge management/hiding literature. Firstly, this study indicates that the contextual factor of psychological safety climate is an important predictor for knowledge hiding. This finding justifies the argument of Connelly et al. (2012) that employees consider situational and contextual stimuli when a colleague request knowledge. Employees are likely to reveal knowledge that has been requested by a colleague in favor of the cooperative team atmosphere that they experience, reinforcing the social exchange among them.

Second, this study provides insights into the relationship between knowledge hiding and team performance. Employees' knowledge hiding behavior is likely to harm employee relationships, as this action may involve active attempts at deception (Connelly & Zweig, 2015), impairing team communication. In addition, knowledge hiding is likely to diminish team coordination as an outcome of decreased information exchange (Bartol & Srivastava, 2002). Therefore, one could think that the distrust loop between knowledge seeker and knowledge hider in combination with the decreased team communication and coordination would result in inferior team performance. However, the results did not support that knowledge hiding decreases team performance. On the contrary, there was some evidence supporting that knowledge hiding

increases team performance. Even if the hypothesis was rejected, the close to significant results may lead to following speculations. It is likely that although employee relationships were impaired, the individual performance of the knowledge hider might have compensated for the detrimental effect of knowledge hiding incidents. The aforementioned knowledge disclosing may have ensuing personal costs, such as time and effort (Connelly & Zweig, 2015). Hence when an employee decides to hide knowledge from a colleague, this choice could be made for his or her own benefit. That is, the knowledge hider would have more time and energy to concentrate his/her effort on his/her own task, which could eventually benefit the overall performance of the team to a higher extent than disclosing the requested knowledge. In addition, given that psychological safety is in place, employees tend to not take disagreements personally (Bradley et al., 2012), mitigating the distrust loop in the knowledge hider-seeker relationship. Hence, knowledge hiding that takes place in such a context may not lead to poor team performance.

The third theoretical contribution lies in the relationship between psychological safety climate and team performance. Psychological safety climate was found to reinforce team plan composition and execution, since it encourages divergent ideas and productive knowledge behaviors (Burke et al., 2006). In addition, team members under this climate experience positive interpersonal interactions among them, since they experience a sense of openness and feel free to express their ideas as their colleagues will not embarrass or reject them for that (Carmeli, 2007; Carmeli et al., 2010; A. C. Edmondson & Mogelof, 2005). As team members successfully manage the team's social interactions, they have more available time for managing work related challenges (Bradley et al., 2012). Therefore, psychological safety climate improves team processes, resulting in superior team performance.

The fourth contribution of this study is the introduction of the mediating role of knowledge hiding between the relationship of psychological safety climate and team performance. Previous research explained the relationship between psychological safety climate and team performance through the lens of constructive knowledge behavior (Edmondson, 1999; Kostopoulos & Bozionelos, 2011). This study, following a different approach and drawing on social exchange theory (Blau, 1964), hypothesized that psychological safety climate decreases knowledge hiding incidents, which in turn enhances team performance. However, the hypothesis was rejected. A potential cause could be the underlying reasoning behind employees' decisions to hide knowledge. It is possible that employees had benevolent or partially benevolent intentions when deciding to hide knowledge. Connelly et al. (2012) argued that knowledge hiding does not necessarily imply a knowledge hider has malicious intentions. For example, a knowledge hider might decide on hiding knowledge to protect another individual or to preserve confidentiality. In such situations, the knowledge seeker's perceptions of collegiality may not be negatively influenced. Hence, the interpersonal dynamics of the team may not be hindered, leaving the team performance unaffected. Under this line of reasoning, it would also be possible that knowledge hiding leads to superior team performance or does not affect it. As the knowledge holder hides knowledge to protect her/his colleague, the latter could be grateful for this gesture, resulting in increased social exchange between the knowledge seeker and knowledge hider.

### **Limitations and future research**

As in any study, the present study is not without limitations. Firstly, the study design of this study is cross-sectional and thus, the possibility of reverse causality cannot be discarded when interpreting the results. Although the directions of the hypothesized relationships are based on existing theory, alternative interpretations of the findings are likely to exist. For example,

team performance may increase knowledge hiding. Employees that work in a team that perform well may desire to differentiate themselves from their colleagues by hiding knowledge. In so doing, they will maintain the privilege of owning the knowledge and be valuable members of the team. Future research might implement the (quasi)experiment method or longitudinal design to draw causal relationships (Bogilović et al., 2017; Černe et al., 2014).

Secondly, the sample size at the team level was relatively small (Maas & Hox, 2005), as it was comprised of 36 teams. Hence, the statistical power in multilevel modeling might not be enough to obtain accurate estimations for the hypothesized effects (Scherbaum & Ferreter, 2009). Despite this, the sample size exceeds the minimum threshold of 30 teams, as established by Maas and Hox (2005). Therefore, multilevel modeling might be considered as the most appropriate approach for this study, with the interplay between knowledge hider and the whole team providing a better understanding of the knowledge hiding phenomenon.

Thirdly, this study was based on survey data collection and although we controlled against common method bias, by collecting data from line managers and team members, the variable of knowledge hiding was self-reported by team members. Knowledge hiding is likely a relatively under-reported low-base-rate event, since it is considered as a negative behavior (Connelly et al., 2012). Although self-report is likely to be the best approach, since usually only the knowledge hider could know if knowledge hiding occurred, future studies are still encouraged to gain insights on knowledge hiding by applying experimental design.

Fourthly, as the focus of this study was on the aforementioned mediation model, some informative variables were potentially neglected. Although the effect of knowledge hiding on team performance did not depict incontestable statistical power, the direction of the relationship was found to be positive. Therefore, this relationship seems to be more complicated than initially

proposed. Future research should include more variables to give insight into this relationship. For example, knowledge hidiers' intentions could shed light on the explanatory mechanism of knowledge hiding (Connelly et al., 2012). It is likely that contradictory intentions (positive vs negative) of knowledge hiding have opposite results on team performance. In addition, job-related variables, such as task interdependence might mitigate the knowledge hiding-team performance relationship. Task interdependence refers to the extent to which the interaction and coordination of team members are required to complete tasks (Guzzo & Shea, 1992). Therefore, team members that work under conditions of high task interdependence are likely to perceive knowledge hiding as an action of betrayal that sabotages a team's collective mission and effort (Černe et al., 2017). As a consequence, team performance could be diminished by the impairment of team dynamics and processes.

### **Practical implications**

In a knowledge based economy, the act of knowledge hiding might threaten the firm's competitive advantage. The findings of this study emphasize the significant role of psychological safety climate in predicting knowledge hiding and team performance. In situations where team members perceive the team climate as safe for interpersonal risk taking, they tend to conceal knowledge to a lesser degree. In addition, psychological safety climate can facilitate voice behavior, initiative, and proactive behavior (Edmondson et al., 2004) that can be beneficial to team performance. Therefore, organizations should consider whether the overall climate facilitates the growth of psychological safety climate, intervening when factors such as increased conflict and mistrust act as barriers to its enhancement. Interventions, such as conflict resolution and relationship-building training could increase psychological safety climate. For example, team – building exercises that coach team members on how to cope with conflict among team

members and manage interpersonal risk-taking by others in a constructive manner may cultivate a positive organizational climate (e.g., Boehm & Dwertmann, 2015).

Team leaders also play an essential role in creating a strong psychological safety climate. Leader inclusivity (Nembhard & Edmondson, 2006) and openness to subordinate input (Edmondson, 2003) relate to increased psychological safety climate. Therefore, organizations that desire to hire team leaders should examine whether the candidate has exhibited behaviors in the past that foster psychological safety climate. Moreover, organizations should encourage team leaders to develop managerial behaviors that promote psychological safety climate. This can be achieved by measuring, developing and rewarding such managerial behaviors. For example, subordinates can provide assessment about their leader relating to the extent that their leader pays attention to them, considers their ideas, and attempts to address the matter raised. Subsequently, team leaders could participate in developmental and accountability programs that will target to coach team leaders on how to promote voice and discussion among team members.

The results of the present study displayed some evidence that increased knowledge hiding may potentially lead to superior performance. However, the practical implication of this result should be considered in the light of the knowledge hider's intentions. Knowledge hiding does not always have to be driven by a desire to deceive, but can also be stimulated by positive intentions (e.g., to protect their feelings or to preserve confidentiality) (Connelly & Zweig, 2015; De Geofroy & Evans, 2017). Therefore, if managers observe apparent knowledge hiding amongst employees, the underlying reasoning of this action should be heavily considered, and actions taken accordingly. For example, if the intention of knowledge hider is clearly benevolent, managers could reinforce an impersonal response from the knowledge seeker, and likewise attempt to increase the communication between the employees involved. In the opposing

situation, if the knowledge hider's motivations are clearly insidious or self-serving, managers could examine the motivations of this action and address any incident separately. Regardless, the reasons that drive employees to hide knowledge are not only related to personal factors, but also to situational factors (Connelly & Zweig, 2015; Connelly et al., 2012; Peng, 2013). For example, when the organizational climate does not promote knowledge sharing initiatives, employees tend to hide more knowledge than when working in a climate which facilitates cooperation and learning (Černe et al., 2014; Kim, Kim, & Yun, 2015). When it comes to enhancing team performance, team leaders should be looking to work hand in hand with their subordinates to build a psychological safety climate which effectively eliminates knowledge hiding, and the detrimental effects associated with it.

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## Appendices

### Appendix 1: Questionnaire employees

Please provide us with the first two initials of your supervisor name and surname (e.g., for John Doe, put JODO): \_\_ We need this information to be able to compare and link answers.

No one, including your supervisor, will get to see your answers (except the Tilburg University research team).

#### *Work climate, part I*

Please rate the relationships between you and your colleagues in your team on each of the following items. Answer possibilities range from (1) very untrue (2) untrue (3) somewhat untrue (4) neutral (5) somewhat true (6) true (7) very true.

1. If anyone in your team needs something, the others give it without expecting anything in return
2. Many important things you use belong to the team, not to anyone separately
3. People in the team share many important responsibilities jointly, without assigning them to anyone alone
4. People in the team feel a moral obligation to feel kind and compassionate to each other
5. People in the team make decisions together by consensus
6. People in the team tend to develop very similar attitudes and values
7. People in the team feel that they have something unique in common that makes them essentially the same
8. People in the team are a unit: they belong together
9. What you get from people in your team is directly proportional to how much you give them
10. People in the team divide things up according to how much each of them has paid or contributed
11. If anyone in the team worked for another team member, he or she would be paid in proportion to how long they worked or how much they did
12. People in the team have a right (they are entitled) to a fair rate of return for what they put into the team interaction
13. With people in the team, you make decisions according to the ratio of the benefits you get and the costs to you

14. One of the team members often pays another team member to do something
15. You expect to get the same rate of return on your effort and investment that other team members get
16. Your team interactions are strictly rational: you each calculate what your payoffs are, and act accordingly

*Work climate, part II*

Please answer the following questions using answer categories ranging from (1) very untrue (2) untrue (3) somewhat untrue (4) neutral (5) somewhat true (6) true (7) very true.

17. If you make a mistake on this team, it is often held against you.
18. Members of this team are able to bring up problems and tough issues.
19. People on this team sometimes reject others for being different.
20. It is safe to take a risk on this team.
21. It is difficult to ask other members of this team for help.
22. No one on this team would deliberately act in a way that undermines my efforts.
23. Working with members of this team, my unique skills and talents are valued and utilized.

*Work climate, part III*

For each statement, indicate how much you agree with this; answer categories range from (1) strongly disagree (2) disagree (3) somewhat disagree (4) neither agree nor disagree (5) somewhat agree (6) agree, to (7) strongly agree.

24. My colleagues help me to do a good job.
25. My colleagues always pass on important information to me.
26. My colleagues do their best to collaborate with me in a proper way.
27. I feel proud to belong to this work group.
28. I am glad that I belong to this work group and not to another work group.
29. I feel very committed to this work group.
30. I feel comfortable around my co-workers.
31. My co-workers seem to accept me as one of them.

*Knowledge, part I*

Please rate the following options on a range of (1) not at all (2) to a very small extent (3) to a small extent (4) to a moderate extent (5) to a fairly great extent (6) to a great extent (7) to a very great extent.

Please think of a recent episode in which a specific co-worker requested knowledge from you and you declined to share your knowledge or expertise with him/her or did not give all of the information needed.

In this instance I:

- 32. Agreed to help him/her but never really intended to
- 33. Agreed to help him/her but instead gave him/her information different from what she/he wanted
- 34. Told him/her that I would help him/her out later but stalled as much as possible
- 35. Offered him/her some other information instead of what he/she really wanted
- 36. Pretended that I did not know the information
- 37. Said that I did not know, even though I did
- 38. Pretended I did not know what she/he was talking about
- 39. Said that I was not knowledgeable about the topic
- 40. Explained that I would like to tell him/her, but was not supposed to
- 41. Explained that the information is confidential and only available to people on particular project
- 42. Told him/her that my boss would not let anyone share this knowledge
- 43. Said that I would not answer his/her questions

*Knowledge, part II*

Continue thinking of the specific knowledge situation you chose. Finish the following sentence:

"The knowledge I did not share was...

- 44. Valuable 1 2 3 4 5 6 7 Worthless
- 45. Informative 1 2 3 4 5 6 7 Uninformative
- 46. Helpful 1 2 3 4 5 6 7 Harmful

*Personal characteristics, part I*

Below are listed 5 statements that describe things people do or try to do on their jobs. We would like to know the extent to which you feel these statements are accurate. For each statement, indicate how much you agree with this; answer categories range from (1) strongly disagree (2) disagree (3) somewhat disagree (4) neither agree nor disagree (5) somewhat agree (6) agree, to (7) strongly agree.

- 47. I seek an active role in the leadership of a group.
- 48. I avoid trying to influence those around me to see things my way.
- 49. I find myself organizing and directing the activities of others.
- 50. I strive to gain more control over the events around me at work.
- 51. I strive to be “in command” when I am working in a group.

*Personal characteristics, part II*

For each statement, indicate how much you agree with this; answer categories range from (1) strongly disagree (2) disagree (3) somewhat disagree (4) neither agree nor disagree (5) somewhat agree (6) agree, to (7) strongly agree.

I see myself as someone who...

- 52. Is original, comes up with new ideas.
- 53. Does things efficiently.
- 54. Is sometimes rude to others.
- 55. Does a thorough job.
- 56. Values artistic, aesthetic experiences.
- 57. Has an active imagination.
- 58. Has a forgiving nature.
- 59. Tends to be lazy.
- 60. Is considerate and kind to almost everyone.

*Personal characteristics, part III*

For each statement, indicate how much you agree with this; answer categories range from (1) strongly disagree (2) disagree (3) somewhat disagree (4) neither agree nor disagree (5) somewhat agree (6) agree, to (7) strongly agree.

- 61. I will be able to achieve most of the goals that I have set for myself.
- 62. When facing difficult tasks, I am certain that I will accomplish them.
- 63. In general, I think that I can obtain outcomes that are important to me.
- 64. I believe I can succeed at most any endeavor to which I set my mind.
- 65. I will be able to successfully overcome many challenges.
- 66. I am confident that I can perform effectively on many different tasks.
- 67. Compared to other people, I can do most tasks very well.
- 68. Even when things are tough, I can perform quite well.

*Personal characteristics, part IV*

For each statement, indicate how much you agree with this; answer categories range from (1) strongly disagree (2) disagree (3) somewhat disagree (4) neither agree nor disagree (5) somewhat agree (6) agree, to (7) strongly agree.

- 69. If I see something I don't like, I fix it.
- 70. No matter what the odds, if I believe in something I will make it happen.
- 71. I love being a champion for my ideas, even against others' opposition.
- 72. I excel at identifying opportunities.
- 73. I am always looking at better ways to do things.
- 74. If I believe in an idea, no obstacle will prevent me from making it happen.

*Personal characteristics, part V*

Please indicate how likely the following situations are; answer categories range from (1) absolutely no expressed intent, (2) no expressed intent, (3) no intent, (4) neither intent nor no intent, (5) intent, (6) expressed intent, (7) absolutely expressed intent.

- 75. During the next year, I will probably look for another job outside my current employer.
- 76. I am seriously considering quitting my current employer for an alternative employer.

*Organizational characteristics, part I*

For each statement, indicate how much you agree with this; answer categories range from (1) strongly disagree (2) disagree (3) somewhat disagree (4) neither agree nor disagree (5) somewhat agree (6) agree, to (7) strongly agree.

- 77. My organization cares about my opinions.
- 78. My organization really cares about my wellbeing.
- 79. My organization strongly considers my goals and values.
- 80. My organization shows a lot of concern for me.

#### Organizational characteristics, part II

The answer categories for the following question range from (1) never, (2) rarely, (3) occasionally, (4) sometimes, (5) frequently, (6) usually to (7) always.

- 81. Can you count on your colleagues when you encounter difficulties in your work?
- 82. If necessary, can you ask your colleagues for help?
- 83. Do you get on well with your colleagues?
- 84. Is there a good atmosphere between you and your colleagues?

#### *Organizational characteristics, part III*

The following questions are about you and your colleagues; answer categories range from (1) strongly disagree (2) disagree (3) somewhat disagree (4) neither agree nor disagree (5) somewhat agree (6) agree, to (7) strongly agree.

- 85. I have to obtain information and advice from my colleagues in order to complete my work.
- 86. I depend on my colleagues for the completion of my work.
- 87. I have a one-person job; I rarely have to check or work with others.
- 88. I have to work closely with my colleagues to do my work properly.
- 89. In order to complete their work, my colleagues have to obtain information and advice from me.

#### *Organizational characteristics, part IV*

Please indicate how satisfied you are with the following practices; answer categories range from (1) extremely dissatisfied (2) dissatisfied (3) somewhat dissatisfied (4) not dissatisfied/not satisfied (5) somewhat satisfied (6) satisfied (7) extremely satisfied.

- 90. How your unit recruits and selects employees

91. Employee development and career opportunities

92. Rewards

93. Performance evaluation

94. Participation and communication

Background characteristics

95. Are you...  Male  Female

96. Age: \_\_\_\_\_ Years

97. How long have you been working in this organization? \_\_\_\_\_ Years

98. How long have you been working in this team? \_\_\_\_\_ Years

99. What is your highest level of education?

1. 'elementary': primary school

2. 'basic': lower secondary education, lower vocational education

3. 'middle': upper secondary education, secondary vocational education

4. 'higher': higher professional education

5. 'academic': university

## Appendix 2: Questionnaire line manager

Please provide us with the first two initials of your name and surname (e.g., if your name is John Doe, put JODO): \_\_\_\_ We need this information to be able to compare and link answers. No one, including HR or employees, will get to see your answers (except the Tilburg University research team).

### *Work climate, part I*

Please rate the relationships among the people in your team on each of the following items.

Answer possibilities range from (1) very untrue of this relationship (2) untrue of this relationship (3) somewhat untrue of this relationship (4) neutral (5) somewhat true of this relationship (6) true of this relationship (7) very true of this relationship

1. If anyone in my team needs something, the others give it without expecting anything in return
2. Many important things my team members use belong to the team, not to anyone separately
3. People in the team share many important responsibilities jointly, without assigning them to anyone alone
4. People in the team feel a moral obligation to feel kind and compassionate to each other
5. People in the team make decisions together by consensus
6. People in the team tend to develop very similar attitudes and values
7. People in the team feel that they have something unique in common that makes them essentially the same
8. People in the team are a unit: they belong together
9. What team members get from other people in your team is directly proportional to how much they give them
10. People in the team divide things up according to how much each of them has paid or contributed
11. If anyone in the team worked for another team member, he or she would be paid in proportion to how long they worked or how much they did
12. People in the team have a right (they are entitled) to a fair rate of return for what they put into the team interaction

13. People in the team make decisions according to the ratio of the benefits they get and the costs to them
14. One of the team members often pays another team member to do something
15. Team members expect to get the same rate of return on their effort and investment that other people in the team get
16. Team interactions are strictly rational: members each calculate what their payoffs are, and act accordingly

*Work climate, part II*

Please rate the following questions using the following answer categories: (1) very inaccurate (2) inaccurate (3) somewhat inaccurate (4) not inaccurate/not accurate (5) somewhat accurate (6) accurate (7) very accurate.

17. If you make a mistake on this team, it is often held against you.
18. Members of this team are able to bring up problems and tough issues.
19. People on this team sometimes reject others for being different.
20. It is safe to take a risk on this team.
21. It is difficult for members of this team to ask others for help.
22. No one on this team would deliberately act in a way that undermines other members' efforts.
23. Working with members of this team, everyone's unique skills and talents are valued and utilized.

*Knowledge*

Please rate the following options on a range of (1) not at all (2) to a very small extent (3) to a small extent (4) to a moderate extent (5) to a fairly great extent (6) to a great extent, (7) to a very great extent.

Please think of a recent episode in which a specific co-worker from your team requested knowledge from another co-worker and he or she declined to share knowledge or expertise with him/her or did not give all of the information needed. In this instance he/she:

24. Agreed to help him/her but never really intended to
25. Agreed to help him/her but instead gave him/her information different from what she/he wanted

26. Told him/her that he/she would help him/her out later but stalled as much as possible
27. Offered him/her some other information instead of what he/she really wanted
28. Pretended that he/she did not know the information
29. Said that he/she did not know, even though he/she did
30. Pretended he/she did not know what he/she was talking about
31. Said that he/she was not knowledgeable about the topic
32. Explained that he/she would like to tell him/her, but was not supposed to
33. Explained that the information is confidential and only available to people on particular project
34. Told him/her that his/her boss would not let anyone share this knowledge
35. Said that he/she would not answer his/her questions

#### *Team performance*

In comparison with other teams that perform similar tasks, how does your team score on the following points. Please use the following answer categories: (1) far below average (2) below average (3) somewhat below average (4) average (5) somewhat above average (6) above average (7) far above average.

36. Efficiency of employees
37. Quality of products and services
38. Overall achievement
39. Productivity of employees
40. Mission fulfillment

#### *HR practices*

Please answer these questions using the following answer categories, ranging from (1) very inaccurate (2) inaccurate (3) somewhat inaccurate (4) not inaccurate/not accurate (5) somewhat accurate (6) accurate (7) very accurate.

In this section, we would like to know your opinion about why your company has the HR policies and practices it has. Please tell us the extent to which you agree with each of the statements below.

The organization provides employees the training that it does:

- 41. ...in order to help employees deliver quality service to customers;
- 42. ...so that employees will feel valued and respected—to promote employee well-being;
- 43. ...to try to keep costs down;
- 44. ...in order to get the most work out of employees.

The organization provides employees the benefits that it does (e.g., health care, retirement plans):

- 45. ...in order to help employees deliver quality service to customers;
- 46. ...so that employees will feel valued and respected—to promote employee well-being;
- 47. ...to try to keep costs down;
- 48. ...in order to get the most work out of employees.

The organization makes the hiring choices that it does (i.e., the number and quality of people hired):

- 49. ...in order to help employees deliver quality service to customers;
- 50. ...so that employees will feel valued and respected—to promote employee well-being;
- 51. ...to try to keep costs down;
- 52. ...in order to get the most work out of employees.

The organization pays its employees what it does:

- 53. ...in order to help employees deliver quality service to customers;
- 54. ...so that employees will feel valued and respected—to promote employee well-being;
- 55. ...to try to keep costs down;
- 56. ...in order to get the most work out of employees.

The organization schedules employees the way it does (hours, flexibility, leave policies):

- 57. ...in order to help employees deliver quality service to customers;
- 58. ...so that employees will feel valued and respected—to promote employee well-being;
- 59. ...to try to keep costs down;
- 60. ...in order to get the most work out of employees.

*Background characteristics*

61. What is your birth date? Year: \_\_\_\_\_ Month: \_\_\_\_\_

62. Are you...

1.  Male 2.  Female

63. How long have you been working in this organization? \_\_\_\_\_ Years

64. How long have you been the manager of this team? \_\_\_\_\_ Years

65. How many people are employed in your team? (including yourself)? Number of people:  
\_\_\_\_\_

66. How many FTE is this? Number of FTE: \_\_\_\_\_

67. What is your highest level of education?

1. 'elementary': primary school

2. 'basic': lower secondary education, lower vocational education

3. 'middle': upper secondary education, secondary vocational education

4. 'higher': higher professional education

5. 'academic': university

68. What type of sector are you working for?

Industry

Energy and Water

Construction

Trade

Hospitality

Transport and communication

Financial services

Business services

Public administration

Education

Health and welfare

Culture and other services

Other: \_\_\_\_\_

### Appendix 3: Confirmatory factor analysis for psychological safety climate and knowledge

#### hiding

Notes for Psychological safety climate

#### MODEL FIT INFORMATION

Number of Free Parameters 21

Loglikelihood

H0 Value	-1918.257
H1 Value	-1903.836

Information Criteria

Akaike (AIC)	3878.513
Bayesian (BIC)	3944.488
Sample-Size Adjusted BIC	3877.993
(n* = (n + 2) / 24)	

Chi-Square Test of Model Fit

Value	28.842
Degrees of Freedom	14
P-Value	0.0110

RMSEA (Root Mean Square Error Of Approximation)

Estimate	0.079
90 Percent C.I.	0.037 0.120
Probability RMSEA <= .05	0.115

CFI/TLI

CFI	0.968
TLI	0.952

Chi-Square Test of Model Fit for the Baseline Model

Value	484.135
Degrees of Freedom	21

P-Value	0.0000
---------	--------

SRMR (Standardized Root Mean Square Residual)

Value	0.040
-------	-------

Notes for Knowledge hiding

#### MODEL FIT INFORMATION

Number of Free Parameters	63
---------------------------	----

Loglikelihood

H0 Value	-2562.023
H1 Value	-2544.448

Information Criteria

Akaike (AIC)	5250.047
Bayesian (BIC)	5447.972
Sample-Size Adjusted BIC	5248.487
(n* = (n + 2) / 24)	

Chi-Square Test of Model Fit

Value	35.150
Degrees of Freedom	27
P-Value	0.1351

RMSEA (Root Mean Square Error Of Approximation)

Estimate	0.042
90 Percent C.I.	0.000 0.077
Probability RMSEA <= .05	0.605

CFI/TLI

CFI	0.994
TLI	0.986

Chi-Square Test of Model Fit for the Baseline Model

Value	1518.950
-------	----------

Degrees of Freedom	66
P-Value	0.0000

SRMR (Standardized Root Mean Square Residual)

Value	0.028
-------	-------

## Appendix 4: Multi-level confirmatory factor analysis

### MODEL FIT INFORMATION

Number of Free Parameters                      92

#### Loglikelihood

H0 Value	-3058.281
H0 Scaling Correction Factor	2.187
for MLR	
H1 Value	-2964.874
H1 Scaling Correction Factor	1.771
for MLR	

#### Information Criteria

Akaike (AIC)	6300.561
Bayesian (BIC)	6589.594
Sample-Size Adjusted BIC	6298.283
( $n^* = (n + 2) / 24$ )	

#### Chi-Square Test of Model Fit

Value	139.835*
Degrees of Freedom	88
P-Value	0.0004
Scaling Correction Factor	1.336
for MLR	

\* The chi-square value for MLM, MLMV, MLR, ULSMV, WLSM and WLSMV cannot be used

for chi-square difference testing in the regular way. MLM, MLR and WLSM chi-square difference testing is described on the Mplus website. MLMV, WLSMV, and ULSMV difference testing is done using the DIFFTEST option.

#### RMSEA (Root Mean Square Error Of Approximation)

Estimate	0.059
----------	-------

#### CFI/TLI

CFI	0.948
-----	-------

TLI 0.922

#### Chi-Square Test of Model Fit for the Baseline Model

Value	1127.714
Degrees of Freedom	132
P-Value	0.0000

#### SRMR (Standardized Root Mean Square Residual)

Value for Within	0.026
Value for Between	0.032

#### STANDARDIZED MODEL RESULTS

##### STDYX Standardization

	Estimate	S.E.	Two-Tailed Est./S.E.	P-Value
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##### Within Level

KH	BY	Estimate	S.E.	Two-Tailed Est./S.E.	P-Value
	Q4_1	0.586	0.107	5.469	0.000
	Q4_2	0.642	0.112	5.743	0.000
	Q4_3	0.699	0.123	5.700	0.000
	Q4_4	0.778	0.076	10.219	0.000
	Q4_5	0.774	0.057	13.647	0.000
	Q4_6	0.859	0.057	14.976	0.000
	Q4_7	0.731	0.069	10.673	0.000
	Q4_8	0.714	0.099	7.219	0.000
	Q4_9	0.639	0.082	7.795	0.000
	Q4_10	0.513	0.098	5.229	0.000
	Q4_11	0.703	0.080	8.834	0.000
	Q4_12	0.560	0.085	6.604	0.000

##### Between Level

PSS	BY	Estimate	S.E.	Two-Tailed Est./S.E.	P-Value
	Q2_1_M	0.897	0.061	14.803	0.000
	Q2_2_M	0.819	0.080	10.292	0.000
	Q2_3_M	0.730	0.142	5.136	0.000
	Q2_4_M	0.875	0.052	16.793	0.000
	Q2_5_M	0.837	0.081	10.360	0.000

Q2_6_M	0.666	0.089	7.455	0.000
Q2_7_M	0.836	0.054	15.440	0.000
TP				
BY				
Q6_1	0.832	0.062	13.406	0.000
Q6_2	0.867	0.048	18.135	0.000
Q6_3	0.880	0.053	16.512	0.000
Q6_4	0.765	0.073	10.466	0.000
Q6_5	0.810	0.070	11.503	0.000

## Appendix 5: Model output

Mplus VERSION 6.12

MUTHEN & MUTHEN

12/13/2018 7:45 PM

### INPUT INSTRUCTIONS

TITLE: Master\_thesis;

DATA: FILE IS C:\Users\Maria\Desktop\final\trial3\_delete15\log\final\_data1.dat;

VARIABLE: NAMES ARE

Team Q2\_1 Q2\_2 Q2\_3 Q2\_4 Q2\_5 Q2\_6 Q2\_7 Q4\_1 Q4\_2  
 Q4\_3 Q4\_4 Q4\_5 Q4\_6 Q4\_7 Q4\_8 Q4\_9 Q4\_10 Q4\_11  
 Q4\_12 Q16 Q17 Q18 Q19 Q20 Q6\_1 Q6\_2 Q6\_3 Q6\_4 Q6\_5  
 Q40\_1 Q40\_2 Q40\_3 Q40\_4 Q40\_5 Q40\_6 Q40\_7  
 Q2\_1\_m Q2\_2\_m Q2\_3\_m Q2\_4\_m  
 Q2\_5\_m Q2\_6\_m Q2\_7\_m team\_s logt\_s;

MISSING ARE all (-999);

USEVARIABLES ARE

Team Q17 Q18 logt\_s PCS KH t\_perf;

CLUSTER IS Team;

BETWEEN ARE t\_perf PCS logt\_s;

DEFINE: KH=

$(Q4_1+Q4_2+Q4_3+Q4_4+Q4_5+Q4_6+Q4_7+Q4_8+Q4_9+Q4_10+Q4_11+Q4_12)/12;$

$PCS = (Q2_1_m+Q2_2_m+Q2_3_m+Q2_4_m+Q2_5_m+Q2_6_m+Q2_7_m)/7;$

$t\_perf = (Q6_1+Q6_2+Q6_3+Q6_4+Q6_5)/5;$

ANALYSIS: TYPE IS TWOLEVEL RANDOM;

MODEL: %WITHIN%

KH;

KH ON Q17;

KH ON Q18;

%BETWEEN%

PCS t\_perf logt\_s;

KH ON PCS(a);

t\_perf ON KH(b);

t\_perf ON PCS;

t\_perf ON logt\_s;

KH ON Q17(d);

KH ON Q18(e);

MODEL CONSTRAINT: NEW(indb);  
                   indb=a\*b;  
 OUTPUT:      TECH1 TECH8 CINTERVAL;

INPUT READING TERMINATED NORMALLY

Master\_thesis;

#### SUMMARY OF ANALYSIS

Number of groups	1
Number of observations	171
Number of dependent variables	2
Number of independent variables	4
Number of continuous latent variables	0

Observed dependent variables

Continuous  
 T\_PERF  KH

Observed independent variables

Q17  Q18  LOGT\_S  PCS

Variables with special functions

Cluster variable  TEAM  
 Between variables  
 LOGT\_S  PCS  T\_PERF

Estimator	MLR
Information matrix	OBSERVED
Maximum number of iterations	100
Convergence criterion	0.100D-05
Maximum number of EM iterations	500
Convergence criteria for the EM algorithm	
Loglikelihood change	0.100D-02
Relative loglikelihood change	0.100D-05
Derivative	0.100D-03

Minimum variance 0.100D-03  
 Maximum number of steepest descent iterations 20  
 Maximum number of iterations for H1 2000  
 Convergence criterion for H1 0.100D-03  
 Optimization algorithm EMA

Input data file(s)

C:\Users\Maria\Desktop\final\trial3\_delete15\log\final\_data1.dat  
 Input data format FREE

SUMMARY OF DATA

Number of missing data patterns 1  
 Number of clusters 36

Average cluster size 4.750

Estimated Intraclass Correlations for the Y Variables

Intraclass  
 Variable Correlation

KH 0.109

COVARIANCE COVERAGE OF DATA

Minimum covariance coverage value 0.100

PROPORTION OF DATA PRESENT

	Covariance Coverage				
	T_PERF	LOGT_S	PCS	KH	Q17
T_PERF	1.000				
LOGT_S	1.000	1.000			
PCS	1.000	1.000	1.000		
KH	1.000	1.000	1.000	1.000	
Q17	1.000	1.000	1.000	1.000	1.000
Q18	1.000	1.000	1.000	1.000	1.000

	Covariance Coverage
	Q18
Q18	1.000

THE MODEL ESTIMATION TERMINATED NORMALLY

#### MODEL FIT INFORMATION

Number of Free Parameters 17

#### Loglikelihood

H0 Value	-1521.017
H0 Scaling Correction Factor for MLR	1.355
H1 Value	-1519.068
H1 Scaling Correction Factor for MLR	1.100

#### Information Criteria

Akaike (AIC)	3076.033
Bayesian (BIC)	3129.441
Sample-Size Adjusted BIC ( $n^* = (n + 2) / 24$ )	3075.612

#### Chi-Square Test of Model Fit

Value	6.960*
Degrees of Freedom	8
P-Value	0.5409
Scaling Correction Factor for MLR	0.560

\* The chi-square value for MLM, MLMV, MLR, ULSMV, WLSM and WLSMV cannot be used

for chi-square difference testing in the regular way. MLM, MLR and WLSM chi-square difference testing is described on the Mplus website. MLMV, WLSMV, and ULSMV difference testing is done using the DIFFTEST option.

RMSEA (Root Mean Square Error Of Approximation)

Estimate	0.000
----------	-------

## CFI/TLI

CFI	1.000
TLI	1.106

## Chi-Square Test of Model Fit for the Baseline Model

Value	35.692
Degrees of Freedom	16
P-Value	0.0032

## SRMR (Standardized Root Mean Square Residual)

Value for Within	0.001
Value for Between	0.079

## MODEL RESULTS

		Estimate	S.E.	Two-Tailed Est./S.E.	P-Value
Within Level					
KH	ON				
Q17		-0.014	0.013	-1.126	0.260
Q18		0.002	0.016	0.148	0.882
Residual Variances					
KH		0.685	0.184	3.729	0.000
Between Level					
KH	ON				
PCS		-0.243	0.095	-2.566	0.010
Q17		-0.042	0.019	-2.202	0.028
Q18		0.051	0.023	2.247	0.025
T_PERF	ON				
KH		1.684	0.872	1.932	0.053
PCS		0.622	0.236	2.633	0.008
LOGT_S		-0.551	0.313	-1.760	0.078

Means

LOGT_S	1.256	0.069	18.092	0.000
PCS	5.272	0.128	41.097	0.000

Intercepts

T_PERF	-0.264	2.502	-0.105	0.916
KH	4.004	0.913	4.386	0.000

Variances

LOGT_S	0.174	0.054	3.237	0.001
PCS	0.593	0.211	2.812	0.005

Residual Variances

T_PERF	0.613	0.250	2.456	0.014
KH	0.012	0.036	0.335	0.738

New/Additional Parameters

INDB	-0.409	0.210	-1.948	0.051
------	--------	-------	--------	-------

#### QUALITY OF NUMERICAL RESULTS

Condition Number for the Information Matrix (ratio of smallest to largest eigenvalue)	0.205E-07
--	-----------

#### CONFIDENCE INTERVALS OF MODEL RESULTS

	Lower .5%	Lower 2.5%	Lower 5%	Estimate	Upper 5%	Upper 2.5%	Upper .5%
--	-----------	------------	----------	----------	----------	------------	-----------

##### Within Level

KH	ON							
Q17		-0.047	-0.039	-0.035	-0.014	0.007	0.011	0.018
Q18		-0.038	-0.028	-0.023	0.002	0.028	0.033	0.042

##### Residual Variances

KH	0.212	0.325	0.383	0.685	0.988	1.046	1.159
----	-------	-------	-------	-------	-------	-------	-------

##### Between Level

KH	ON							
PCS		-0.487	-0.428	-0.399	-0.243	-0.087	-0.057	0.001
Q17		-0.092	-0.080	-0.074	-0.042	-0.011	-0.005	0.007

Q18	-0.008	0.007	0.014	0.051	0.089	0.096	0.110
T_PERF ON							
KH	-0.562	-0.025	0.250	1.684	3.118	3.393	3.930
PCS	0.013	0.159	0.233	0.622	1.011	1.085	1.230
LOGT_S	-1.356	-1.164	-1.065	-0.551	-0.036	0.062	0.255
Means							
LOGT_S	1.077	1.120	1.142	1.256	1.370	1.392	1.435
PCS	4.942	5.021	5.061	5.272	5.483	5.524	5.603
Intercepts							
T_PERF	-6.709	-5.168	-4.380	-0.264	3.853	4.641	6.182
KH	1.652	2.214	2.502	4.004	5.505	5.793	6.355
Variances							
LOGT_S	0.035	0.068	0.085	0.174	0.262	0.279	0.312
PCS	0.050	0.180	0.246	0.593	0.939	1.006	1.135
Residual Variances							
T_PERF	-0.030	0.124	0.202	0.613	1.023	1.102	1.256
KH	-0.080	-0.058	-0.047	0.012	0.071	0.082	0.104
New/Additional Parameters							
INDB	-0.950	-0.821	-0.754	-0.409	-0.064	0.003	0.132