

A Multilevel Approach to Self-directed Employee Behavior: Evidence from South Korea

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Abstract: Self-directed employees are often regarded as the key resource for making continual organizational success in business. In recent years, a few leading business organizations have introduced and implemented autonomy supporting human resource (HR) practices to encourage employees to present a high level of self-directed behavior. However, not all business organizations have been able to reap the benefits of autonomy supporting HR practices, and some fail in drawing positive outcomes. The purpose of this study is to identify and understand the role and impact of perceptions of autonomous work environments and positive psychological capital that affect self-directed behavior in a non-western cultural context with a multilevel approach. To achieve this purpose, this study investigates the relationships between employee perception of autonomous work environment (AWE), positive psychological capital (PsyCap), and self-directed behavior (SDB) in large Korean manufacturing companies. 331 surveys from 43 teams in six large Korean automotive part manufacturing companies were gathered and analyzed by using simple OLS regression and hierarchical linear modeling (HLM) analyses. Results revealed significant cross-level direct and indirect effects of supervisor's perception of AWE and subordinate's PsyCap on subordinates' SDB. The combination of providing a high level of AWE for supervisors and developing the PsyCap of subordinates along with institutionalizing self-directed employee behavior as a performance appraisal is suggested as a strategic option for organizations to reap the benefits of autonomy supporting HR practices.

Key words: multilevel approach; self-directed employee behavior; psychological capital; South Korea

JEL codes: M01

1. Introduction

Self-directed employees are often regarded as the key resource to make continual organizational successes in business (Manz & Sims, 1995; Stewart, Courtright, & Manz, 2011). Self-directed behavior (SDB) refers to employee behavior that “demonstrates internal control such that desirable acts occur in the absence of external constraints such as supervision and procedural controls” (Stewart, Carson, & Cardy, 1996, p. 144). SDB focuses on the how employees and subordinates manage and lead themselves and the effects this has on overall team or organizational performance [bottom-up managerial approach] (Stewart et al., 2011) while the conventional top-down managerial approach focuses on how leaders and organizations influence employees (Manz & Sims,

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1980). SDB differs from organizational citizenship behavior (OCB) because it occurs in the routine functions of a job. SDB is explicitly recognized as a desirable employee behavior when an individual performs a job while OCB is considered to be an extra-role, beyond the job behavior that is unrewarded by the formal system or contextual performance (Organ, 1997).

In the 21st century workplace, the importance of self-directed behavior is increasing because the nature of work quickly changes as information and communication technology (ICT) rapidly advances and global integration deepens. In recent years, a few leading business organizations applied and implemented autonomy supporting HR practices in response to the strong demand for more self-directed employee behavior in the workplace (Mediratta, 2007). For instance, Google's twenty percent time rule allows employees to spend one day a week working on their own projects that are relevant to the overall organizational goals, not necessarily in their job descriptions.

But not all business organizations have been able to reap the benefits of autonomy supporting HR practices, which include training and development interventions that are intended to nurture self-directed behavior. Many companies have tried emulating and applying Google's twenty percent time rule, 3M's fifteen percent time policy, and the ROWE HR practice, but have failed to draw positive outcomes (Goetz, 2011; Von Hippel, Thomke, & Sonnack, 1999). This is because organizational leaders, HR managers, and frontline managers do not have sufficient knowledge or understanding about the dynamics of employee perceived autonomous work environments and how they interact with employee personal characteristics and affect the self-directed behavior within the organizations (Stewart et al., 1996; Stewart et al., 2011).

Thus, there is a need for a research to cultivate new knowledge and further understanding about the effects of contextual and personal factors on self-directed employee behavior in the workplace. There is little empirical research on the multilevel effects of contextual and personal factors on self-directed employee behavior. This study applied the multilevel approach in order to address the research question "What are the multilevel effects of the contextual and personal factors on self-directed employee behavior?"

The purpose of this study was to identify and understand the role and impact of perceptions of work environments and personal psychological characteristics that affect self-directed behavior in a non-western cultural context with two levels — team and individual. To achieve this purpose, this study investigated the multilevel relationships of perception of autonomous work environment (AWE), psychological capital (PsyCap), and self-directed behavior (SDB) in six large manufacturing companies. The researcher selected the large Korean automotive manufacturing industry as the field setting for this study because the self-directed behavior of non-western employees was relatively untapped in the literature (Ardichvili, 2011; Luthans, Avey, Clapp-Smith, & Li, 2008).

2. Literature Review

Self-directed behavior refers to employee "behavior that demonstrates internal control such that desirable acts occur in the absence of external constraints such as supervision and procedural controls" (Stewart et al., 1996, p. 144). In recent years, the concept of self-directed behavior has received special attention from management, psychology, and human resource scholars and practitioners because contemporary business organizations believe that self-directed employees are the key factor for organizational success (Manz & Sims, 1995; Stewart et al., 1996; Stewart et al., 2011; Watson & Tharp, 1997).

Self-directed behavior is viewed as a skill that is learned and developed in the workplace (Watson & Tharp, 1997). Viewing self-directed behavior as a skill implies that the behavior is adapted to particular environments and certain personal factors (Watson & Tharp, 1997). The theoretical rationale behind identifying self-directed behavior as a learned and developed skill in the workplace can be illustrated by Kurt Lewin's field theory and Bandura's social learning theory. Lewin (1939) argued that human behavior cannot be explained solely by a person or by an environment, but it can be understood as a function of the person in interaction with the environment. Taking this notion, social learning theory suggested the model of triadic reciprocity as depicted in Figure 1 (Bandura, 1986).

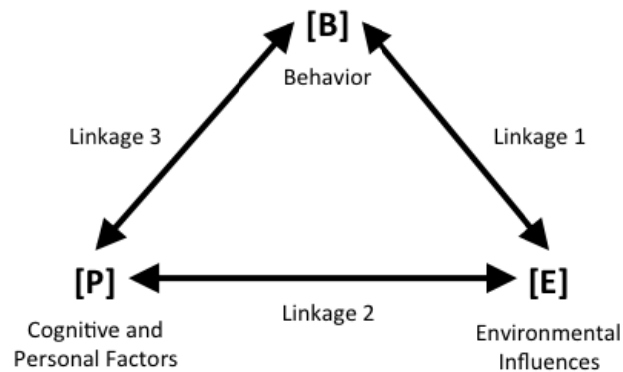


Figure 1 Bandura's (1986) Model of Triadic Reciprocity

The model of triadic reciprocity indicates that individual behavior (B), personal factors (P), and environmental influences (E) mutually affect one another. Thus, human behavior changes through the self-regulation process that comes from continual interactions with personal factors and environment influences (Bandura, 1986).

In this study, autonomous work environment (AWE) is set as the environmental factor and psychological capital (PsyCaP) as the personal factor that influence self-directed behavior.

2.1 Autonomous Work Environment (AWE)

The autonomous work environment gives employees choices, encourages employees to take a personal initiative, and manages employees' perceptions about the consequence of interpersonal risks. Specifically in this study, the autonomous work environment is suggested as a construct that is composed of autonomy support, psychological safety, and the quality of leader-member exchange.

Autonomy in the workplace has been conceptualized in many different ways as the nature of work and business environments have changed. For example, autonomy in the workplace once simply meant the job characteristics that provided employees with freedom and independence over their work schedules and work processes during the predominant manufacturing environment of the seventies (Hackman & Oldham, 1980). The emergence of new manufacturing technologies in the eighties and nineties such as flexible manufacturing systems (FMS), total quality management (TQM), just-in-time (JIT), continuous improvement process (CIP or Kaizen), and lean production required an extended concept of autonomy in the workplace. Wall, Corbett, Martin, Clegg, and Jackson (1990) proposed three forms of autonomy in the workplace: autonomy in timing control (say in work schedule and production speed), method control (discretion in undertaking work tasks), and boundary control (integration across work units and employees). Starting in the early 21st century, the concept of autonomy in the workplace has integrated additional dimensions such as decision-making autonomy, performance criterion

autonomy, and context-related autonomy (e.g., high involvement work system). These additional dimensions of workplace autonomy have more significantly emerged as the knowledge work increases, technology advances, and global integration deepens (Gagné & Bhavé, 2011).

Employee perceived autonomous work environment has been heavily studied as an antecedent of self-directed behavior. Researchers have claimed that the employee perceived autonomous work environments such as autonomy supporting environments (Gagné, 2003), psychologically safe environments (Edmondson & Nembhard, 2009), and environments with high quality exchanges with supervisors (Volmer, Spurk, & Niessen, 2011) encourage subordinates to have high levels of self-directed behavior in the workplace.

2.2 Positive Psychological Capital (PsyCap)

Positive psychological capital (PsyCap) is defined as:

An individual's positive psychological state of development that is characterized by: (1) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resilience) to attain success (Luthans, Youssef, & Avolio, 2007, p. 3).

The positive relationship between PsyCap and self-directed behavior can be inferred from several previous studies even though there is no direct examination of the actual relationship. A meta-analysis study indicated there was a strong positive relationship between PsyCap and positive employee behavior ($k = 8$, corrected $r = 0.45$, $SD = 0.15$), and there was a strong negative relationship between PsyCap and negative employee behavior ($k = 7$, corrected $r = -0.42$, $SD = 0.12$) (Avey, Reichard, Luthans, & Mhatre, 2011, p. 143). Researchers of the meta-analysis study reasoned that employees who have high levels of PsyCap exhibited more positive employee behaviors — for example sharing creative ideas or making suggestions for improvement that can be characterized as self-directed behavior (Avey et al., 2011) because positive employees utilized broader thought-action repertoires and built various types of psychological resources for the positive behavior (Fredrickson, 2001).

2.3 PsyCap Contagion in Multilevel

Several researchers have found that subordinates and a supervisor in a work unit or a team have different levels of personal psychological capital. If a supervisor of a team has a high level of PsyCap, it influences subordinates to have high levels of PsyCap and positively changes subordinates' behaviors (Avolio, Gardner, Walumbwa, Luthans, & May, 2004; Avolio & Luthans, 2005). This interactional phenomenon of PsyCap between subordinates and a supervisor in a work unit is commonly explained by the theory of emotional contagion.

Emotional contagion theory suggests that supervisors' emotions can influence the emotions of individual subordinates or a group of subordinates through a conscious or unconscious induction processes (Rapson, Hatfield, & Cacioppo, 1993). Emotional contagion theorists claim that people naturally, automatically, and continuously mimic the emotions, behaviors (Bono & Ilies, 2006; Rapson et al., 1993), and specifically PsyCap of others (Hodges, 2010). For example, an empirical study of police supervisors and their subordinates indicated that supervisor's PsyCap was positively related to subordinates' positive behavior, with the relationship mediated by subordinates' PsyCap (Walumbwa, Peterson, Avolio, & Hartnell, 2010). In this sense, subordinates perceived their supervisor's PsyCap and adjusted their own PsyCap to more closely match the supervisor's PsyCap. After this adjustment, subordinates may manage their own self-directed behavior in accordance with the learned PsyCap level.

More recently, Walumbwa, Luthans, Avey, and Oke (2011) proposed the concept of collective PsyCap at the work group level. In an empirical study of a large bank, the collective PsyCap of the group mediated the

relationship between the group's perceived leadership of their supervisor and the group's behaviors that resulted in different levels of group performances.

Hypothesis 1. A group of subordinates who work for a supervisor who has higher PsyCap would likely have higher collective PsyCap.

2.4 The Mediating Role of Collective PsyCap

The mediating role of PsyCap between work environment and positive employee behavior at the individual level has been supported with several empirical studies. For example, Luthans, Norman, Avolio, and Avey (2008) conducted a study with three different populations — business students, employees at a service firm, and employees at a large high-tech manufacturing firm in the U.S. — to examine the mediating role of PsyCap, and they found it to have a full mediation effect between work environment and employee performance. More recently, the mediation effect of PsyCap in the relationship between work environment and positive employee behavior was empirically supported not only at the individual level (Luthans, Youssef, & Rawski, 2011), but also working group (team) level (Walumbwa et al., 2011). Thus, the collective PsyCap of a group of subordinates that is affected by a supervisor's PsyCap may mediate the group's perceived autonomous work environment and individual self-directed behaviors of subordinates.

Hypothesis 2. The collective PsyCap mediates the relationship between group perceived autonomous work environment and individual level self-directed behavior.

The nested and multilevel nature of this study is depicted as the Figure 2.

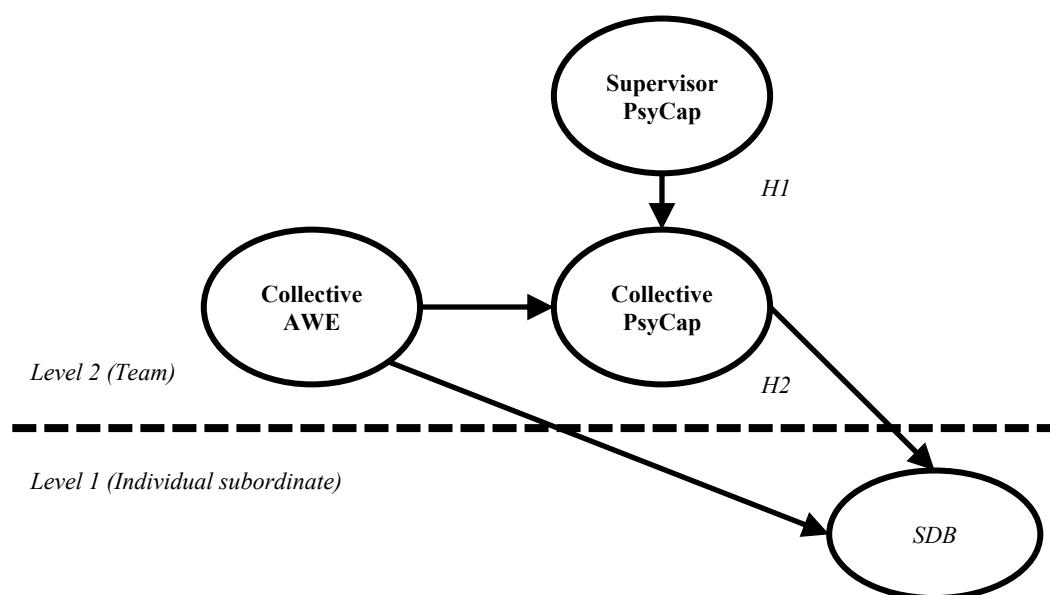


Figure 2 Multilevel Model of Self-directed Behavior

Note: AWE: Autonomous work environment. PsyCap: Psychological capital. SDB: Self-directed Behavior

3. Method

3.1 Sample and Procedure

Two written survey forms were administered to supervisors and subordinates in six large (with more than 300 employees) Korean automotive parts manufacturing companies to measure the core variables and gather

demographic information. Supervisors were requested to provide evaluations of their assessment of all his or her subordinates' self-directed behavior. The researcher also requested at least three subordinates complete surveys per supervisor to meet the minimum requirement for multilevel analysis (Walumbwa et al., 2010). Supervisors also completed a measure of their perceptions of autonomous work environment and personal positive psychological capital. Personal information such as age, gender, education level, job position, and organizational tenure were also requested from supervisors. Subordinates received a survey packet that was separated from the supervisor survey. Subordinates were asked to complete a survey that measured their perceptions about the level of autonomy in the work environment, personal positive psychological capital, and their demographic information.

489 surveys (73.0%) out of 679 distributed surveys were collected. Collected surveys from subordinates and supervisors were matched and screened to conduct quantitative data analyses. By using the code and name initials from employees, the researcher matched collected surveys by team and organization. 135 surveys were not able to match because employees did not give the necessary code or name initials for matching. 23 surveys were screened out from matched data sets because of insufficient data input. After matching and screening data, a total of 331 (49.4%) surveys were selected for further quantitative data analysis. The selected 331 dataset was composed of 43 surveys from supervisors and 288 surveys from subordinates.

Participants of this study could be characterized as well-educated, experienced, male technical experts. More than sixty four percent (64%) of participants have a four-year or graduate college diploma. The majority of participants, more than seventy eight percent (78.7%), worked in technical departments such as research and development (R&D), manufacturing, and quality management. The average age of subordinates ($n = 288$) was 34.7, and the average age of supervisors ($n = 43$) was 45.7 years old. The age distribution of the sample showed that the majority of subordinates were in their thirties (30-40 year old, 53%) while the majority of supervisors were in their forties (40-50, 69.7%). The average tenure of subordinates was 5.8 years whereas the average tenure of supervisors was 14.7 years within participating organizations. This result indicated that participating employees were commonly experienced in performing their jobs. Finally, men clearly outnumbered women by almost nine to one. All participating supervisors were males. This fact showed that the workplace of large Korean automotive part manufacturing companies was homogeneous in the perspective of gender diversity.

3.2 Measurement Instrument

3.2.1 Autonomous Work Environment

In this study, the autonomous work environment was measured with three instruments: autonomy supporting environment by work climate questionnaire (WCQ) (Baard, Deci, & Ryan, 2004); psychological safety (PsySafe) (Edmondson, 1999); and the quality of social exchange in the perspective of subordinate (LMX-MDM) and in the perspective of supervisor (SLMX-MDM) (Greguras & Ford, 2006).

First, autonomy supporting was measured by WCQ. This 15-item scale assesses a subordinate's perceptions of the degree of autonomy supportiveness of their supervisors (Baard et al., 2004). It included items such as "I feel my supervisor provides me with choices and options about my work." Responses were made on 6-point scales ranging from 1 (strongly disagree) to 6 (strongly agree). The WCQ reported its high internal consistency and reliability not only in general workplace settings (Baard et al., 2004) but also in a healthcare field (Cronbach's $\alpha = 0.96$) (Williams, Grow, Freedman, Ryan, & Deci, 1996), and educational settings (Cronbach's $\alpha = 0.92$) (Williams & Deci, 1996).

Second, psychological safety was measured with seven items that were introduced by Edmondson (1999). A sample item for team psychological safety is "It is safe to take a risk in this unit". The reliability of the

psychological safety was reported as Cronbach's $\alpha = .82$ (Edmondson, 1999). Another empirical study in the U.S. that used the psychological safety measure also showed strong reliability for it (Cronbach's $\alpha = .82$) (Kim, 2007). For this study, the researcher used a Korean version of the psychological safety measure. The reliability of this Korean version was acceptable (Cronbach's $\alpha = 0.74$) (Zhang, 2011).

Third, the quality of social exchange between subordinates and supervisor was measured with the subordinate version and supervisor version of the leader-member exchange (LMX) questionnaires that were developed and used in prior research. Conventionally, LMX had been used for measuring subordinates' perception of the quality social exchanges with their supervisors. However, Greguras and Ford (2006) argued that measuring only subordinates' perception of LMX might be significantly flawed because another source of information from supervisors was missing in the dyadic relationship between subordinate and supervisor. The supervisor version of LMX measure, called SLMX-MDM (supervisor perceived leader-member exchange — multi dimensional measure), was proposed to measure the supervisor's perceptions about the quality of social exchange with his or her subordinates (Greguras & Ford, 2006).

The SLMX-MDM was developed by adapting the LMX-MDM (subordinate perceived leader-member exchange — multi dimensional measure) (Liden & Maslyn, 1998). The SLMX-MDM included items such as "My subordinate(s) is the kind of person one would like to have as a friend." The LMX-MDM instrument for subordinates included items such as "My supervisor is the kind of person one would like to have as a friend." Responses were made on a 6-point scales ranging from 1 (strongly disagree) to 6 (strongly agree). The Cronbach's α of the SLMX-MDM was .90, and the LMX-MDM was .92 (Greguras & Ford, 2006).

The re-translation (or frequently called back translation) technique was used to translate the WCQ and LMX instruments in order to minimize inaccuracy of the translation by following Brislin's guidelines for re-translation (Brislin, 1980).

3.2.2 Psychological Capital

Positive psychological capital was measured with a reduced version (12 items, PCQ-12) of the original 24-item psychological capital questionnaire (PCQ-24) (Luthans et al., 2007). The PCQ-12 included three items for efficacy, four items for hope, two items for optimism, and three items for resilience. Responses were put into a six-point Likert-type scale with these categories: 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree, and 6 = strongly agree (Luthans, Norman et al., 2008). Sample items for each subscale included the following: "I felt confident in representing my project area in meetings with management" (efficacy); "If I should find myself in a jam at work, I could think of many ways to get out of it" (hope); "I always looked on the bright side of things regarding my job" (optimism); and "I could get through difficult times at the project because I've experienced difficulty before (resilience)."

PsyCap measure had acceptable reliability and validity. A meta-analytic research about PsyCap found the Cronbach's α of PsyCap to be .88 (Avey et al., 2011). In this study, a Korean version of PsyCap was used. Previously, the Korean version was administered to 272 Korean workers from 235 Korean corporations, and its Cronbach's α was .87 (Park, 2010).

The collective PsyCap was obtained by aggregating individual PsyCaps within a group, and it is set as level 2 variables that hold the shared unit properties. Kozlowski and Klein (2000) suggested that "researchers whose models contain unit-level constructs should indicate explicitly whether their constructs are global unit properties, shared unit properties, or configural unit properties" (p. 22). Shared unit properties describe the characteristics that are shared by the members of a unit such as organizational climate, collective efficacy, and group norms

(Kozlowski & Klein, 2000). In this sense, PsyCap that is shared by a group of subordinates can be aggregated as the group autonomous work environment and collective PsyCap (level 2), presumed to originate in individual unit members' perceptions and converge among group members (Kozlowski & Klein, 2000).

Between-group differences such as intraclass correlations ($ICC[1] = .157$), the reliability of the means ($ICC[2] = .555$, $F = 2.25$, $p < .001$) (Bliese, 2000), and within-group agreement ($r_{wg} = .71 \sim 1.00$). James, Demaree, & Wolf (1984, 1993) presented acceptable levels of data aggregation for shaping a collective PsyCap.

3.2.3 Self-directed Behavior

The self-directed behavior of employees was measured with the following four items that were proposed by Stewart et al. (1996): (a) coming up with new, original ideas for handling work; (b) redesigning job tasks for greater effectiveness and efficiency, even if it is not required; (c) taking initiative and doing whatever is necessary; (d) going against established policies and procedures if he or she thinks it would result in meeting broader organizational goals. The four-item scale had an acceptable internal consistency reliability of more than .90 using Cronbach's alpha in previous studies (Bono & Judge, 2003; Stewart et al., 2011). Responses are made on a 6-point scales ranging from 1 (strongly disagree) to 6 (strongly agree).

The self-directed behavior instrument was used for whole performance measure (Stewart et al., 1996) or an important part of job performance (Bono & Judge, 2003) in various workplace settings such as service, manufacturing, government, and non-profit organization because those performance behaviors in the instrument had been shown to be related positively to customer satisfaction (Bitner, Booms, & Tetreault, 1990), individual and organizational creativity, and productivity (Stewart et al., 2011). The re-translation technique was applied for translating the self-directed behavior measure.

3.2.4 Control Variables

Employees' thinking, behaviors, and attitudes may be influenced by demographic variables such as gender, age, education level, organizational tenure, and role in an organization (Luthans, Avolio, Walumbwa, & Li, 2005; Luthans, Norman et al., 2008). Studies examining self-directed behavior (Stewart et al., 1996), PsyCap (Avey, Luthans, Smith, & Palmer, 2010), and autonomous work environment (Gagné, 2003) reported that these demographic variables needed to be carefully treated in order to draw meaningful and reliable results. For example, Luthans et al. (2005) study on Chinese workers' PsyCap found that there was a need to control demographic variables in order to examine the effect of PsyCap on Chinese workers' performance. In this sense, demographic information of gender, age, education level, organizational tenure, and job position were collected to examine the potential influential relationships with core variables of this study, in order to control for undesired effects from inherent variables.

3.3 Data Analysis

Multiple quantitative data analysis techniques were used in order to address the purpose of this study and examine the proposed hypotheses, including confirmatory factor analysis, descriptive data analysis, inferential data analysis, and multilevel data analysis. First, the confirmatory factor analysis (CFA) was conducted for each key variable in order to examine the validity of measured variables. Second, the researcher calculated measures of central tendency (mean), standard deviations, and correlations among key variables to describe the characteristics of respondents. The reliability of the instrument and its scales were measured by calculating Cronbach's alpha for each scale. Third, the researcher applied simple ordinary least square (OLS) regression technique in order to examine the PsyCap contagion effect. Finally, hierarchical linear modeling (HLM) was chosen to conduct the multilevel analyses. HLM provides many statistical advantages over conventional OLS regression techniques

because it enables researchers to address cross-level effects by keeping the statistics rigorous (Hofmann, Griffin, & Gavin, 2000). Prior to conducting the multilevel analysis, data aggregation reliability and validity were assessed with intraclass correlation indices (ICC[1], ICC[2]) and within-group agreement index r_{wg} .

4. Result

4.1 Measurement Validity

Confirmatory factor analysis (CFA) results indicated that the measurement instruments of multi-dimensional LMX and PsyCap showed good validity levels (LMX: $\chi^2 = 125.05$; $df = 50$; $RMESEA = .069$; $CFI = .970$; $TLI = .960$; $SRMR = .039$ and PsyCap: $\chi^2 = 18.87$; $df = 2$; $RMESEA = .160$; $CFI = .965$; $TLI = .896$; $SRMR = .039$). Test reliabilities (Cronbach's alpha) of collected data were acceptable for LMX ($\alpha = .84$) and PsyCap ($\alpha = .81$ –.83). The other measurement instruments were modified in order to guarantee validity and reliability levels. For example, a shorter version of autonomy supporting (the short WCQ with 6 items) was selected; four items were purposefully excluded because those items had insufficient factor loadings in the collected data out of seven psychological safety measurement instrument items; item 4 of “going against established policies and procedures” was removed from measuring self-directed employee behavior.

The feasibility of data aggregation was examined because the data had a nested structure by nature. The level of agreement among group members, ICC [1] = .157~.192, and the estimate of the reliability of a group mean, ICC [2] = .555~.614 indicated that the level 2 variables of collected PsyCap and collected AWE had acceptable agreement levels and reliabilities. Within-unit agreement that was tested by r_{wg} confirmed that all 43 teams' data had acceptable level of agreement both for AWE and for PsyCap, $r_{wg} = .71 \sim 1.00$.

4.2 A Framework for Data Analysis

A framework for data analysis was formulated in order to examine proposed hypotheses. The framework contains two study domains that were constructed by data sources (self-reporting vs. counterpart rated). For example, Domains 1 and 2 analyzed the relationships of subordinates' perceptions of work environment and personal psychological capital on their self-directed behavior. While Domain 1 used the subordinates' self-reported self-directed behavior, Domain 2 used the supervisors' ratings of subordinates' self-directed behavior.

4.3 Hypothesis Testing Results

Means, standard deviations, and correlations among three key study variables in individual level are presented in Table 1.

Table 1 Means, Standard Deviations, and Correlations among Three Key Variables of Subordinates

Subordinates ($n = 288$)	M	SD	1	2	3
1. Autonomous Work Environment	4.38	0.62	1		
2. Psychological capital	4.21	0.62	0.58**	1	
3a Self-reported SDB (Domain 1)	3.96	0.79	0.29**	0.62**	1
3b Supervisor-rated subordinate's SDB (Domain 2)	3.93	0.77	0.13*	0.14*	1

Note: SDB = self-directed behavior. * $p < 0.05$ (two-tailed); ** $p < 0.01$ (two-tailed)

Results shown in Table 1 provide initial evidence of the positive associations suggested in proposed hypotheses. Subordinates' perception of autonomous work environment was positively correlated with

self-directed subordinate behavior, Domain 1: $r = 0.29$, $p < 0.01$; Domain 2: $r = 0.13$, $p < 0.05$. In addition, the subordinates' perception of psychological capital was also correlated with self-directed behavior, Domain 1: $r = 0.62$, $p < 0.01$; Domain 2: $r = 0.14$, $p < 0.05$. It is noteworthy that no control variable was associated with the dependent variable of self-directed behavior. Thus, control variables were not included in further analysis.

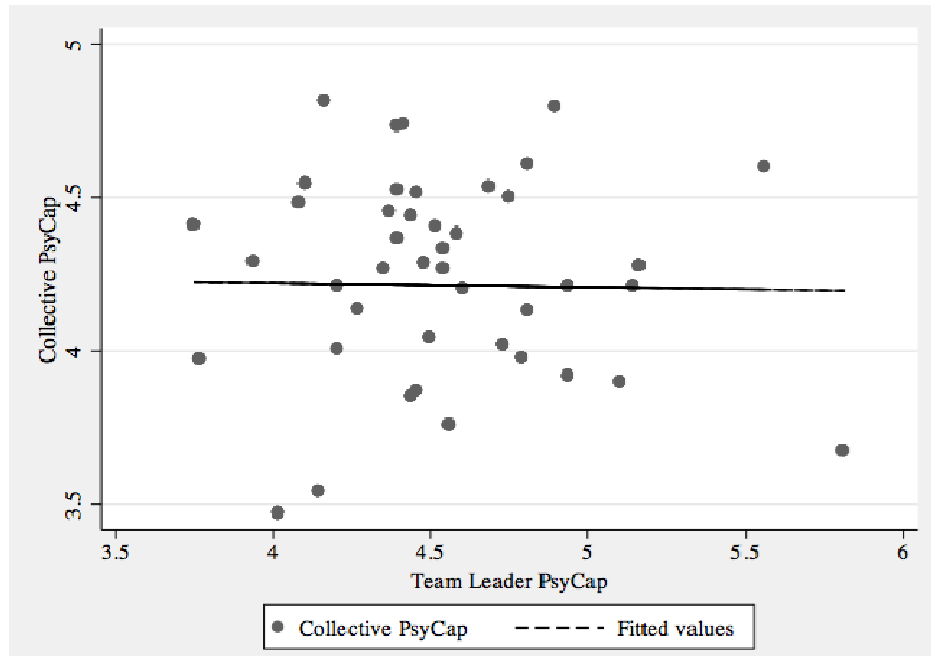


Figure 3 The Relationship between Supervisor PsyCap and Collective Subordinate PsyCap by Teams

Hypothesis 1 predicted a positive relationship between supervisor psychological capital and subordinate collective psychological capital within groups. 43 supervisors' PsyCap was regressed on the aggregated 43 subordinate groups' collective PsyCap. As presented in Figure 3, there seemed to be no relationship between a supervisor's PsyCap and the collective subordinates' PsyCap.

Results of regression analysis confirmed that supervisor's PsyCap had no significant explanatory power over variance of collective subordinate PsyCap, $R^2 = 0.002$, $F(1, 41) = 0.08$, $p = 0.779$. Regression coefficient analysis results suggested that supervisor's PsyCap had a negative relationship, but it was not significant, $\beta = -0.034$, $p = 0.779$.

Hypothesis 2 predicted the mediation effect of collective PsyCap of subordinates on the relationship between collective AWE and individual self-directed subordinate behavior. The multilevel mediation effect was tested with a multilevel mediation technique (see: http://www.ats.ucla.edu/stat/stata/faq/ml_mediation.htm) (Krull & MacKinnon, 2001). Figure 4 shows the results of multilevel mediation effects. The results of the multilevel mediation test indicated that the collective PsyCap mediated the relationship between the collective subordinate AWE and individual self-reported self-directed subordinate behavior, $z = 5.53$, $p < 0.001$ (Domain 1). But the mediation effect of collective subordinate PsyCap was not found between the collective subordinate AWE and individual supervisor-rated subordinates' self-directed behavior, $z = -1.55$, $p = 0.121$. Thus hypothesis 2 was supported in Domain 1 while it was not supported in Domain 2.

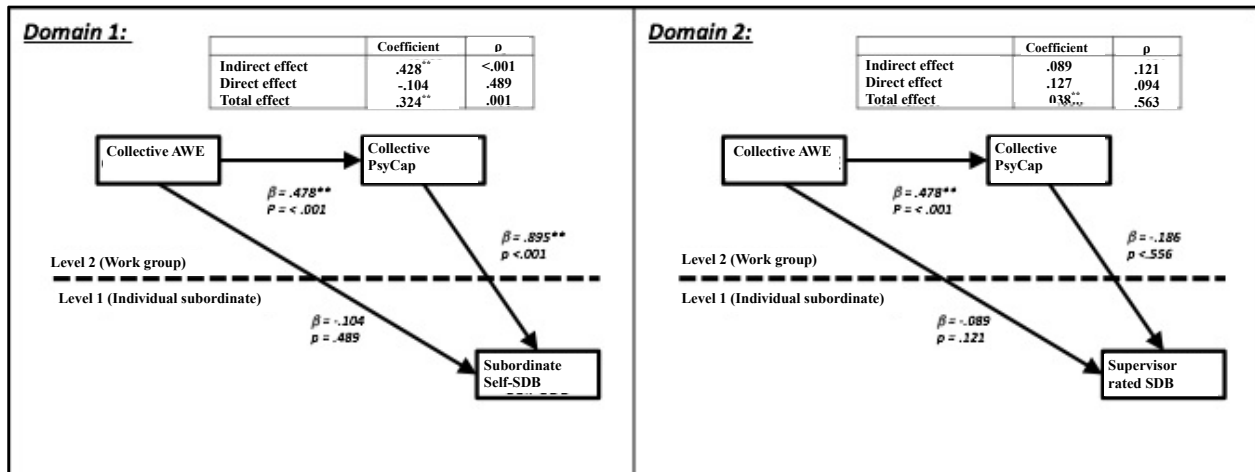


Figure 4 Multilevel Mediation Effect Test Result in Domains 1 and 2

Although the multilevel mediation effect analysis of collective PsyCap provided an initial understanding about multilevel effects of AWE and PsyCap, further multilevel effect analyses of contextual and personal variables on self-directed behavior were necessary to capture a further understanding. Hierarchical linear modeling (HLM) was chosen to conduct further multilevel analyses. HLM provides many statistical advantages over conventional OLS regression or simple multilevel mediation effect analysis techniques because it enables researchers to explore and search cross-level effects by keeping the statistics rigorous (Hofmann et al., 2000). The logic of HLM involves a simultaneous two-stage procedure. The level 1 (individual level) analyses estimate within-unit statistical properties (e.g., means and relations) and the level 2 (group level) analyses treat the level 1 statistics as outcomes to the extent that they vary across level. Thus level 2 analyses model the effects of group level predictors on individual level behaviors (Kozlowski & Klein, 2000).

4.4 Exploring the Best Multilevel Model

In order to search for the best multilevel model for this study, multiple multilevel models were examined with proposed individual level and work group level variables. Two individual level variables (AWE, PsyCap) and four work-group (team) level variables (collective AWE, collective PsyCap, supervisor AWE, supervisor PsyCap) were tested with multiple hierarchical linear models.

Prior to conducting multilevel modeling (MLM) analysis of any nested dataset, the question of whether multilevel modeling is needed is a prudent one. Nested datasets do not automatically require multilevel modeling. If there is no variation in response variable scores across level 2 units (work groups in this study), the data can be analyzed using OLS multiple regression. So the question of whether MLM is needed becomes, “How much response variable variation is present at level 2?” Answering this question involves the calculation of the intraclass correlation (ICC) (Peugh, 2010). ICC can be computed by the equation $\tau_{00}^2 / (\tau_{00}^2 + \sigma_{00}^2)$, where τ_{00}^2 is estimated variance at level 2 (between workgroup variance) and σ_{00}^2 is estimated variance at level 1 (within workgroup variance). If the ICC is smaller than .10, it indicates that we don’t need to use multilevel modeling because there will be no design effect of multilevel modeling (Peugh, 2010).

Results of null model analysis of Domain 1 revealed that 8.8% of the total variance in self-reported self-directed behavior was represented at the workgroup level. The intraclass correlation value of Domain 1 did not reach the minimum 10% expected for further multilevel modeling. Thus, no further multilevel analysis was conducted. On the other hand, results of null model analysis of Domain 2 revealed that 35.9% of the total variance

in supervisor-rated subordinate self-directed behavior was represented at the workgroup level, ICC = .359. The intraclass correlation value met the 10% criterion for further multilevel modeling analysis, and multiple multilevel analyses were conducted in search for the best multilevel model.

Table 2 shows the results of multiple multilevel modeling analyses of Domain 2. It is noteworthy that the individual level subordinate positive psychological capital (PsyCap) was consistently significant in all proposed models. Among the workgroup (team) level variables, only the supervisor AWE was significant in the level of .01. Thus, a selected model was formulated with individual level subordinate PsyCap and workgroup level supervisor AWE.

A random intercept and random slope model were formulated to explore the multilevel model, but no random slope effect was found. When supervisor AWE was set as a random slope factor, the multilevel estimation failed to reach a convergence. A random slope effect of individual PsyCap was very small and statistically insignificant, $\sigma_{(u)} = 1.09e^{-13}$, standard error = $7.75e^{-13}$. With these results, the selected random intercept model was confirmed as the best multilevel model for this study.

Table 2 Results of Multiple Multilevel Models Testing in Domain 2

Supervisor-rated SDB (Domain 2) , Subordinate ($n=288$) Group ($n=43$)	Null Model	Model1	Model2	Model3	Selected Model
<i>Regression coefficient (fixed effect)</i>					
Intercept (γ_{00})	3.913**	2.758**	4.240**	2.172	0.152
AWE (γ_{10}) – L1		0.072	0.057	0.053	
PsyCap (γ_{20}) – L1		0.199**	0.236**	0.238**	0.219**
Collective AWE (γ_{01}) – L2			0.054	-0.193	
Collective PsyCap (γ_{02}) – L2			-0.415	-0.477	
Supervisor AWE (γ_{03}) – L2				0.815**	0.627**
Supervisor PsyCap (γ_{04}) – L2				-0.053	
<i>Variance component (random effect)</i>					
Between (Intercept, τ_{00})	.219**	0.233**	0.226**	0.153**	0.176**
Within (Residual, σ_{00})	.392**	0.368**	0.366**	0.365**	0.369**
Intraclass correlation (ICC, $\tau_{00}/(\tau_{00}^2 + \sigma_{00}^2)$)	.359	0.388	0.381	0.295	0.323
<i>Fit index</i>					
- Log likelihood (MLE)	306.40	299.58	298.32	291.67	295.35
Wald χ^2	-	14.13**	16.71**	32.00**	23.26**
LR test vs. linear regression [χ^2 (01)]	53.02**	59.55**	57.00**	38.49**	43.43**
df	3	5	8	10	5
AIC	618.80	609.16	612.65	603.33	600.71
BIC	629.79	627.48	641.95	639.96	619.02

Note: SDB: self-directed behavior. PsyCap: positive psychological capital, AWE: autonomous work environment. * $p < 0.05$ (two-tailed); ** $p < 0.01$ (two-tailed). MLE: maximum-likelihood estimation. L1: level 1 (individual) variable. L2: level 2 (work group) variable.

Multilevel mediation effect of the individual level subordinate positive psychological capital (PsyCap) of the selected model was examined. The results indicated that the individual subordinate PsyCap significantly mediated the relationship between supervisor AWE and supervisor-rated subordinate self-directed behavior in the level of 5%, *multilevel indirect effect coefficient* = 0.050, $SE = 0.024$, $z = 2.14$, $p = 0.033$; Supervisor AWE \rightarrow SDB = 0.627 ($p < 0.001$), Supervisor AWE \rightarrow 0.227 ($p = 0.089$), Subordinate PsyCap \rightarrow 0.222 ($p = 0.001$).

Taking all factors together in the search for the best multilevel model, the following multilevel model is summarized and proposed as the best multilevel model for this study as depicted in the Figure 5.

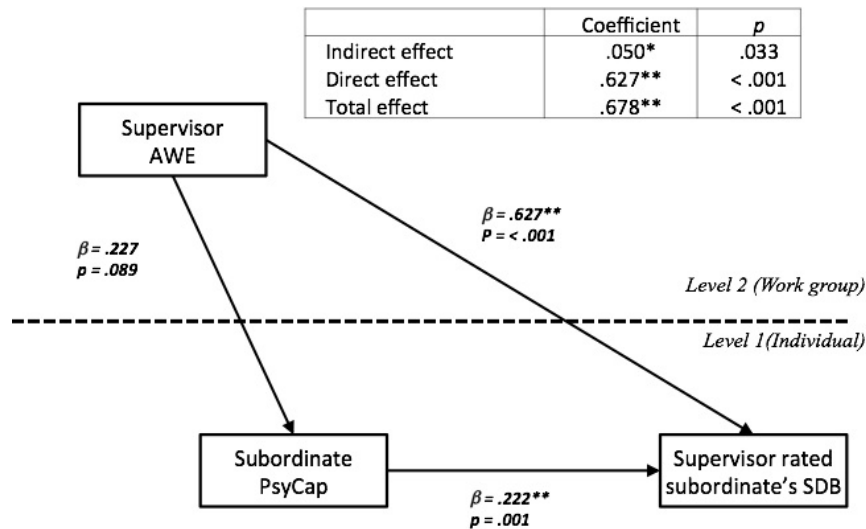


Figure 5 A Proposed Multilevel Model

5. Discussion

This study aimed to identify the multilevel effects of perceptions of work environments and personal psychological characteristics that affect self-directed behavior of employees in South Korean manufacturing companies. Two hypotheses were presented and tested. The first hypothesis predicted a positive relationship between supervisor psychological capital and subordinate collective psychological within groups, but Hypothesis 1 was not supported. The second hypothesis predicted the mediation effect of collective PsyCap of subordinates on the relationship between collective AWE and individual self-directed subordinate behavior. Hypothesis 2 was significantly supported in Domain 1 while it was not supported in Domain 2 as summarized in the following Table 3.

Table 3 Summary of Hypothesis Test Results

H6 (Supervisor PsyCap → Subordinate collective PsyCap)	NS	
	Domain 1	Domain 2
H7 (Mediation of collective PsyCap)	S	NS

Note: S: supported. PS: partially supported. NS: not supported. Domain 1: Subordinate's perception of autonomous work environment and positive psychological capital with self-reported data. Domain 2: Subordinate's perception of autonomous work environment and positive psychological capital with supervisor-rated subordinate's self-directed behavior data.

By applying the HLM method, the best multilevel model was explored and selected. The chosen best multilevel model of this study indicated that the individual subordinate PsyCap significantly mediated the relationship between supervisor AWE and supervisor-rated subordinate self-directed behavior (Domain 2).

From these findings, several implications for business and economics research and practice are proposed in following sections.

5.1 Implications for Theory

Adding to the existing research on psychological capital and self-directed employee behavior, this study revealed that the effects of autonomous work environment (AWE) and positive psychological capital (PsyCap)

were better understood when using the multilevel approach that enabled us to capture a more systematic and layered perspective (Upton & Egan, 2010). For example, several significant multilevel correlations among key variables were found throughout the multilevel analyses in this study. First, the level 2 variable of supervisor's perception of AWE was significantly related with the level 1 variable of supervisor-rated subordinate individual SDB, $\beta = .627, p < .001$. Second, subordinates' individual PsyCap mediated the relationship between supervisor AWE and supervisor-rated subordinate SDB, *indirect effect coefficient* = 0.050, $p < 0.033$.

On the other hand, the multilevel approach of this study revealed that the second-level variable of supervisor's psychological capital did not correlate with collective subordinates' psychological capital in large Korean manufacturing company samples. This result is not compatible with previous research that found a significant positive relationship between supervisor's PsyCap and subordinates' collective PsyCap in a large US Bank (Walumbwa et al., 2011). This contradictory finding calls for further studies in comparative cultural and industrial approach.

From these findings, business and economics researchers are encouraged to apply a multilevel approach in order to capture the multilevel effect of contextual and individual variables on desirable employee behaviors in designing, developing, and proposing managerial interventions. In addition, cultural and industrial differences need to be considered when business and economics researchers conduct a behavioral study.

5.2 Implications for Practice

Underpinning the findings of this study, several practical implications can be suggested for organizational leaders, business professionals, frontline managers, and frontline workers. First, organizational leaders such as top-management or executives need to apply different strategies in developing self-directed employees. Results of multilevel analyses of this study indicated that self-directed subordinate behavior was highly influenced by the supervisor's perceptions of autonomous work environment and subordinate's positive psychological capital. This finding suggests that organizational leaders can encourage employees to have more self-directed behavior through delegating more decision-making powers to supervisors or team leaders when addressing quickly changing work situations at frontline (Gagné & Bhawe, 2011). The necessity of empowering supervisors is compatible with recent business organizations' attempts at replacing conventional hierarchical control with empowering structures to address quickly changing business environments through developing self-directed employees (Manz & Sims, 1995; Stewart et al., 1996; Stewart et al., 2011).

Second, business professionals need to provide systemic support for leveling employee positive psychological capital in order to encourage employees to have higher levels of self-directed behavior. Although self-directed employee behavior has been proposed as a key performance index in academic literature (Bono & Judge, 2003), institutionalizing the self-directed behavior as a performance index is limited in practice. Including self-directed behavior as a key performance indicator into performance appraisal systems is necessary to secure long-term organizational effectiveness (Avey, Luthans, & Youssef, 2010). In addition, providing a structured training program for developing positive psychological capital can be another option for business professionals. Recently, the Psychological Capital Intervention (PCI) has been proven in empirical research to be effective in increasing employee psychological capital (Luthans, Avey, Avolio, & Peterson, 2010).

Third, frontline managers or supervisors who lead a team need to learn how to give positive and developmental feedback to their subordinates in order to develop subordinates' personal psychological capital, which will result in subordinates' working by themselves to achieve team or organizational goals. Experiencing mastery or success in a job or a task is critical for employees to develop positive psychological capital that turns

into better job performance and having a greater intrinsic motivation for work (Luthans et al., 2007). Conventionally human resource departments were responsible for designing jobs for employees, but the job design duty has been handed over to frontline managers, supervisors, or team leaders in contemporary organizations (Oldham & Hackman, 2010). Thus, frontline managers need to make use of systemic supports from HR professionals and take responsibility in helping their subordinates develop high levels of psychological capital.

Finally, frontline workers or subordinates need to take responsibility in developing personal positive psychological capital. Frontline workers need to align their perceptions and behaviors with team or organizational goals throughout continual interactions with their peers, seniors, and supervisors or organizational leaders. Findings of this study indicate that positive psychological capital is an important individual-level intrapersonal capability that results in significant differences in self-directed behavior even under the same work environment. Thus, individuals in the workplace should make pre-emptive efforts to develop and sustain a psychologically capable “self” regardless of the existence of organizational support. For example, reappraising emotional regulation techniques (Gross, 2001) or positive reflection interventions (Bono, Glomb, Shen, Kim, & Koch, 2013) can help frontline workers develop and keep higher levels of positive psychological capital. In addition, these pre-emptive self-help managerial interventions synergize the effectiveness of systemic training and development programs for developing positive psychological capabilities.

5.3 Limitation

Although this study proposed autonomous work environments that were composed with autonomy support, psychological safety, and the quality of leader-member exchange as a contextual variable, there exists limited agreement among researchers over the autonomous work environment. In future research, the validity of the proposed autonomous work environment variable should be examined through the perspective theoretical approach with practical tests with various sample groups.

Second, the cross-sectional and non-experimental design of this study may affect the validity of this study. Cross-sectional data cannot take into account causality or change (Bono & McNamara, 2011). As a result, the external validity of the study may be limited to the research sites at a particular time.

Third, the collective PsyCap comes from aggregating the individual PsyCaps of a group and may cause a model misspecification resulting in limitations of supporting proposed hypotheses. Although aggregating individual level data to shape a group level data is commonly used in multilevel studies when there is a satisfactory level of between- and within-group agreement (Bono & Judge, 2003; Kozlowski, Chao, Grand, Braun, & Kuljanin, 2013), directly measuring the group level construct with a group notion of “We” is necessary for further study.

Finally, the issue of cross-cultural validity was not exceptional for this study. The inaccuracy of the translation of the measurement instrument was a significant risk in cross-cultural research (Luthans et al., 2005). Although a re-translation technique was used in order to minimize inaccuracy of the instrument translation (Brislin, 1980), a few core variables needed modifications. For example on SLMX-MDM measurement, “My subordinate(s) is the kind of person one would like to have as a friend”, the meaning of “friend” at the workplace in the Western society can be perceived differently in the Korean society. According to Hofstede’s cultural dimensions, Korean culture is characterized as highly collectivistic, hierarchical, and uncertainty avoidant, which is highly contrasted to western cultures (see: <http://geert-hofstede.com/south-korea.html>). In the Korean work context, “friend” might be perceived not only as a work-related colleague, but also as a comfortable non-work

related individual.

Another cultural issue is observed in the SDB measuring item of “going against established policies and procedures”. The item might be thought of as an unfavorable self-directed behavior in the Korean culture (Hofstede, 2001), and it resulted in unacceptable factor loading on the SDB measurement.

5.4 Future Research

This study investigated the effects of autonomous work environment and positive psychological capital on self-directed employee behavior in six large Korean manufacturing companies. This study can be an initial stepping stone for further research on self-directed behavior associated with work environment and personal capability in the workplace.

First, regarding the issue of generalizability, follow-up studies investigating the service industry, IT industry, or small-medium sized corporations are highly recommended so that the results of this study generalize to these respective industrial settings.

Second, international comparative studies are necessary to determine whether the findings of this study are compatible in different national cultures in responding to the need for research that explores the effects of autonomous work environment and positive psychological capital on self-directed employee behavior in non-western business contexts (Ardichvili, 2011; Gagné & Bhawe, 2011; Luthans, Avey et al., 2008; Stewart et al., 2011). According to a finding of this study, the effect of subordinates’ collective PsyCap on self-directed behavior was not observed. But the subordinate collective PsyCap was identified as a significant mediator between leadership and group performance in previous research on a large US bank (Walumbwa et al., 2011). This contradictory finding calls for more studies on psychological capital in the perspective of cultural approach and multilevel approach. As discussed in the limitation, the issue of cross-cultural validity needs to be carefully addressed in future research. Participants’ potential inaccurate understanding of measurement items, which might be caused by different cultural and contextual differences, makes it hard to draw solid conclusions.

Third, further personal factors that are interactive with autonomous work environment and self-directed employee behavior should be studied. Investigating the effect of personality can be a good start for future research. Findings of this study indicated that conscientiousness had significant correlations with self-reported self-directed subordinate and supervisor behavior. As illustrated by previous research, high conscientiousness is becoming more significant as contemporary organizations move away from hierarchical control toward employee empowerment (Stewart et al., 1996).

Finally, more extensive multilevel studies are necessary to cultivate additional knowledge and practical implications regarding self-directed behavior. This study focused on individual and team level effects, but the organizational level can be included if more organizational data can be accessed. Such multilevel investigations would allow researchers to explain more variance than would be explained by single-level analysis (Korte, 2008; Upton & Egan, 2010).

In conclusion, the autonomy supporting HR practice would not work well in promoting self-directed employee behavior without nurturing employee’s positive psychological capital. The combination of providing a high level of autonomous work environment for supervisors and developing positive psychological capital of subordinates along with institutionalizing self-directed employee behavior as a performance appraisal would help organizations to reap the benefits of autonomy supporting HR practices.

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