

Distributed leadership and teacher job satisfaction in Singapore

Leadership
and teacher
job satisfaction

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127

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Abstract

Purpose – Singapore is a country with low teacher attrition rates and high performance on international assessments (TIMSS 2011/2015 and PISA 2012/2015). Consequently, its education system is often considered as a model for other nations. The purpose of this paper is to extend research on teacher job satisfaction in Singapore and provide comparative information for other education systems.

Design/methodology/approach – This paper presents a secondary analysis of data from the Organization for Economic Cooperation and Development's 2013 Teaching and Learning International Survey with a focus on relationships among teacher and principal perceptions of distributed leadership and teachers' job satisfaction in Singapore. Hierarchical linear modeling is applied to investigate teacher job satisfaction with principal perceptions and aggregate teacher perceptions of distributed leadership as school-level (level 2) variables and individual teacher perceptions of distributed leadership as a level 1 variable.

Findings – Results indicated that distributed leadership significantly predicted teachers' work and professional satisfaction; higher distributed leadership scores were associated with higher satisfaction scores.

Originality/value – The significant positive relationship between distributed leadership and both dimensions of job satisfaction after accounting for individual teacher characteristics is a new finding in the Singapore schooling context.

Keywords Teachers, Retention, Leadership, Autonomy, Job satisfaction, Distributed leadership

Paper type Research paper

Introduction

In the USA, high teacher turnover has been found to negatively impact student academic achievement (Ronfeldt *et al.*, 2013). This is partially attributable to the loss of teachers with higher levels of education and stronger academic backgrounds (Clotfelter *et al.*, 2007). Teacher turnover is disproportionately greater in under-resourced schools serving large populations of low-income and minority students and lower in resource-rich schools serving students of higher socioeconomic status (SES) (Borman and Dowling, 2008; Boyd *et al.*, 2011), contributing to a disparity in educational opportunity by race/ethnicity and SES.

In order to expand educational equity, many US organizations and initiatives have focused on improving teacher quality in schools serving low-income and minority students. These schools have especially been targeted as sites for teacher recruitment programs such as Teach for America, which places recent college graduates in both urban and rural public schools, and New York City Teaching Fellows, an alternative certification and teacher placement program in urban public schools for college graduates. Few initiatives have focused explicitly on retention and lowering teacher turnover rates. Recruitment of new teachers may do little to increase equity if teachers subsequently leave schools or the profession relatively quickly. As Ronfeldt *et al.* (2013) have shown, high teacher turnover can actually worsen student achievement. Efforts that focus on recruitment and specific qualities of teachers alone without careful attention to factors supporting retention may actually exacerbate inequality.



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Purpose

Insights into policies related to teacher retention in disadvantaged schools can be drawn from a large body of literature, much of it based on US data. Less is known about successful teacher retention policies in other countries. This paper extends research conducted outside the USA, with special attention given to Singapore because it has frequently been considered a model for education policy, largely due to its high rankings on international assessments such as TIMSS 2011/2015 and PISA 2012/2015.

While the social, political, and economic context of Singapore may shape student achievement in distinct ways, education policies in Singapore can provide a fitting contrast for better understanding education systems in other countries, specifically in relation to teacher retention and turnover. Turnover of public school teachers in the USA was at 16 percent in the 2011-2012 school year (Goldring *et al.*, 2014), while only 3 percent was reported by the Singapore Ministry of Education (2013). Prior to that year, the Ministry of Education (MOE) implemented policies promoting school autonomy and local control over professional practice (Dimmock and Yong Tan, 2013). In 1997, the MOE implemented an initiative called the “school cluster project,” in which 22 schools were given autonomy in resource allocation, curriculum and instruction, and assignment of teachers (Tan and Quek, 2001, p. 532). Since then, the MOE has expanded this initiative to 28 clusters of schools and has shifted toward granting greater “autonomy of administrative and pedagogical authority to individual schools” within a highly centralized school system (Dimmock and Young Tan, 2013, p. 326). Such policies may translate into higher levels of teacher retention if local control is distributed among teachers for greater teacher autonomy. Teacher autonomy has been noted as a significant predictor of teacher job satisfaction in both the USA (Ingersoll, 2003) and Singapore (Sim, 1990; Tan and Quek, 2001). Studying leadership quality within the context of an autonomous school environment may provide more information about successful teacher retention policies relevant to other national contexts. This paper focuses on the following research questions:

- RQ1.* Within the Singapore schooling context wherein teacher autonomy – a factor known to influence teachers’ leaving intentions in both Singapore and the USA – is a policy emphasis, is distributed leadership significantly related to teachers’ job satisfaction?
- RQ2.* After controlling for other workplace conditions, does the degree of distributed leadership in a school moderate relationships between teachers’ individual characteristics and their job satisfaction?

Based on previous research that shows significant strong relationships between teachers’ job satisfaction and leadership quality and teachers’ organizational commitment and distributed leadership in different national contexts, the first hypothesis, distributed leadership, will be significantly related to teachers’ job satisfaction in Singapore (Hulpia *et al.*, 2011; Johnson *et al.*, 2012; and others). Given that school environment variables such as workplace conditions have been consistently documented as strong predictors of teacher job satisfaction, the second hypothesis, school-level measures of distributed leadership, will moderate relationships between teachers’ individual characteristics and their job satisfaction.

Theoretical framework

Distributed leadership describes an approach to leadership that considers the participation of multiple actors in its execution. It is different from previous conceptualizations of leadership as residing within the domain of a sole individual in a formal leader role and focuses on interactions among individuals as shaped by specific contexts and activities

(Gronn, 2002; Spillane, 2006). Qualitative differences in leadership may be more indicative of distributed leadership than quantitative differences; it is not just the fact that more than one individual engages in leadership practice but how leadership is enacted that defines distributed leadership. Gronn (2002) describes the latter characterization as a holistic one that highlights conjoint agency.

According to Spillane (2006), distributed leadership is a “perspective or lens for thinking about leadership” rather than a categorical designation (p. 9). That is, distributed leadership is not a leadership type but a framework for investigating processes endemic to leadership. It exists on a spectrum; the extent to which leadership is distributed and the form it takes may vary. Gronn (2002) has argued that distributed leadership is “a unit of analysis which encompasses patterns or varieties of distributed leadership” (p. 424). For example, leadership may be simultaneously distributed and democratic or non-democratic (Gronn, 2009; Spillane, 2006). To date, both researchers and practitioners apply the distributed leadership framework in different ways (see Mayrowetz, 2008).

Early work on distributed leadership was primarily descriptive and exploratory in service to theory development. Subsequent work focused on whether and to what extent different forms of distributed leadership relate to school outcomes. Some of this work applied distributed leadership normatively rather than as a perspective or unit of analysis. Spillane (2006) claims that such a view of leadership is “problematic because the existence of leadership is only acknowledged when there is evidence of its effects or effectiveness,” resulting in “circular arguments,” and relies on a “subset of what is considered to be leadership in organizations” (p. 9). The present study does not apply a normative view of distributed leadership by defining it categorically or as an ideal leadership type; the goal of the study was to investigate the nature of the association, if any, between distributed leadership and teachers’ job satisfaction. Operationalization of the distributed leadership variable is defined by teachers’ and principals’ perceptions of actions indicating the presence of leadership distribution, not specific outcomes. These actions are congruent with descriptions provided by Spillane (2006) and Gronn (2002) that entail social interactions and collaboration among actors to accomplish mutually agreed upon goals.

Literature review

Teacher retention research

Retention studies with US data have shown that teachers are more likely to leave low-SES schools with large proportions of minority students and records of low academic achievement (Guarino *et al.*, 2011; Shen, 1997). These schools often have less positive workplace conditions that contribute to teachers’ leaving intentions (Grissom, 2011; Horng, 2009; Ladd, 2011). Less desirable work conditions appear in clusters; schools with low ratings in one dimension of workplace conditions tend to have lower ratings in other dimensions (Boyd *et al.*, 2011). Studies that do not account for these conditions may show school demographics as predominately explaining teachers’ leaving patterns because demographics are highly correlated with working conditions (Grissom, 2011). When workplace conditions are included in statistical models, the relationship between school demographics and teacher retention, while significant, is attenuated (Boyd *et al.*, 2011; Loeb *et al.*, 2005).

In the research that investigates the role of workplace conditions on retention, the most consistently documented, strongest predictors of retention with US data are teacher participation in school decision making, autonomy, an environment supportive of teacher collaboration, and leadership quality (Borman and Dowling, 2008; Boyd *et al.*, 2011; Brown and Wynn, 2009; Horng, 2009; Ingersoll and May, 2012; Weiss, 1999). In the limited research on teacher retention conducted with Singapore data, autonomy also appears as a strong predictor (Tan and Quek, 2001), as does workplace stress (Fang and Wang, 2006). Among these variables, leadership quality emerged as the most salient factor for teacher

retention in studies by Boyd *et al.* (2011) and Ladd (2011). Grissom (2011) and Ladd (2011) found that leadership quality was even more significant for retention in disadvantaged schools. Thus, leadership quality in schools with the highest teacher turnover has important implications for addressing the disparity in educational outcomes by race/ethnicity and SES partially shaped by school staffing.

Teachers' job satisfaction

Teachers' job satisfaction predicts their intentions to leave schools, with lower levels of job satisfaction indicating a higher probability of attrition. Ladd (2011) showed that teacher perceptions of their work were predictive of actual attrition rates with US data. Also with US data, Stockard and Lehman (2004) found that job satisfaction was the most important influence on retention decisions, while workplace conditions were strongly but indirectly related to retention via job satisfaction. Griffith (2004) noted that leadership quality did not have a direct relationship to teacher attrition but was indirectly related through job satisfaction, a finding echoed in studies by Skaalvik and Skaalvik (2009) with data from Norwegian schools, and Tickle *et al.* (2011) with data from US schools.

Research that tests for antecedents of teachers' job satisfaction mirrors results of retention research; workplace conditions stand out as the most significant predictor of job satisfaction. With other school demographic and teacher background characteristics controlled, teacher autonomy, administrative support and leadership, and staff collegiality were the most commonly reported, strongest predictors of satisfaction (Johnson *et al.*, 2012; Ma and MacMillan, 1999; Shen *et al.*, 2012; Skaalvik and Skaalvik, 2009; Stockard and Lehman, 2004; Tickle *et al.*, 2011). Studies of job satisfaction with Singapore data showed work environment (Sim, 1990), autonomy (Tan and Quek, 2001), and service (Tan and Quek, 2001) as important predictors. The present study uses teacher job satisfaction as the outcome variable instead of retention rates. Since teachers' job satisfaction was directly related to retention and predictors were indirectly related to retention via job satisfaction in several studies, results of the present investigation may provide insight into factors that indirectly lead to retention decisions.

Leadership quality

Leadership may frequently emerge as the strongest predictor of retention because it facilitates other positive work conditions that contribute to teachers' job satisfaction. Weiss (1999) found that teachers viewed their participation in decision making and autonomy, two workplace conditions that significantly predict retention, as facilitated by school leadership. Similarly, a qualitative study by Brown and Wynn (2009) revealed that schools with low teacher attrition and transfer rates in a high-turnover district had principals whose management styles were characterized by collaboration with staff, collective decision making with teachers, and high levels of trust and support.

Several researchers with study results pointing to the importance of leadership in explaining job satisfaction have noted a gap in "[understanding] exactly why the principal is so important and how he or she uses the informal and formal authority of the position to promote teachers' collaborative work and a productive school culture" (Johnson *et al.*, 2012, p. 33), variables noted as significant for teacher job satisfaction and retention. Several suggestions have been made to investigate the specific qualities of leadership and management style that influence teacher job satisfaction (Boyd *et al.*, 2011; Grissom, 2011; Ma and MacMillan, 1999). Few studies have delved further into the relationship and none, to my knowledge, apply a distributed perspective of leadership. Bogler (2001) studied the influence of leadership style on teacher job satisfaction but focused on transformational and transactional forms of leadership, and Griffith (2004) focused

on transformational leadership. Studies of distributed leadership have used a closely related outcome variable, organizational commitment, but not teacher job satisfaction or actual retention rates.

Distributed leadership

Research on distributed leadership with teachers' organizational commitment as the outcome variable documents a significant relationship. Hulpia and Devos (2010) found that teachers were more committed to the school when they had opportunities to participate in school decision making and leaders were accessible, good at problem solving, and supervised teachers' practices closely. Hulpia *et al.* (2011) found that cooperation within the leadership team and participation in school decision making predicted teachers' organizational commitment. It was not particularly important which individual (teacher, assistant principal, or principal) took on the leadership role, but the quality of leadership and the extent to which teachers felt supported that influenced commitment. Hulpia *et al.* (2012) claimed that a numerical definition of distributed leadership was not relevant for teachers' organizational commitment nor was the presence of formal evaluation, a formal supervisory culture, and an equal distribution of leadership at the school. Furthermore, while teacher participation in school decision making was significant for commitment, it was not as salient as teacher perceptions of cooperation and support by leadership. Devos *et al.* (2014) delved further into the role of individual actors in teachers' organizational commitment by looking at the relationship between principal leadership and teachers' organizational commitment as mediated by distributed leadership. Results indicated that the influence of principal leadership on commitment was mediated by actions of assistant principals and teacher leadership, cooperation within the leadership team, and teacher participation in decision making. Thus, the principal may be a key actor that enables distributed leadership within a school and facilitates the favorable work conditions so necessary for teacher commitment via the support of other staff members (Devos *et al.*, 2014).

Research that investigates the relationship between leadership and teachers' organizational commitment, job satisfaction, or retention with Singapore data is limited, as is research that applies a distributed leadership framework to the study of leadership. Two studies in the Singapore context investigated distributed leadership for ICT reform within a single school (Chen, 2013; Ng and Ho, 2012). Other studies that investigated leadership focus on its characterization as shaped by the unique Singapore context (Dimmock and Yong Tan, 2013), the relationships between teacher appraisal and teacher work attitudes (Ong Kelly *et al.*, 2008), and the role of transformational leadership in predicting teacher attitudes and student performance (Koh *et al.*, 1995). Study results from Ong Kelly *et al.* (2008) reflect those of Hulpia *et al.* (2011, 2012) in that teachers' perceptions of support from the leadership team, regardless of which individual provided the support, were more significant for job satisfaction.

Method

The present study used hierarchical linear modeling (HLM) techniques. After accounting for missing data, there were 9,044 teachers and 431 schools comprising the sample included in the HLM analysis. Data were from Teaching and Learning International Survey (TALIS) 2013 administered by the Organization for Economic Cooperation and Development and compiled into a two-level structure; the school-level file consisted of data from the principal questionnaire and the teacher-level file pulled data from the teacher questionnaire. HLM was appropriate for this study because main research questions focused on how school organization factors at level 2 were related to teachers' job satisfaction at level 1. Since teachers were grouped within different school organizations, teachers were nested within schools and HLM could be used to investigate how organizational factors accounted for variations in teacher job satisfaction between schools.

Control variables

Several control variables derived from previous research were included in the model. Teacher self-efficacy was found to be significantly related to teacher commitment in Singapore and all countries participating in an earlier version of the present survey, TALIS 2008 (Chan *et al.*, 2008; Vieluf *et al.*, 2013), so a TALIS 2013 index of teacher self-efficacy was included. Teachers' gender, age, years of experience, education level, and completion of teacher training were significant predictors of teacher retention in the US context (Borman and Dowling, 2008), so these teacher-level characteristics were included as additional controls. At the school level, mean SES of the student population has been shown to predict teacher retention (Borman and Dowling, 2008; Boyd *et al.*, 2011). Since TALIS does not include a measure of mean SES, percentage of disadvantaged students in the school was used. All schools included in the sample were publicly managed, so there was no need to control for sector (private/public). Stress and school identification were not addressed in the TALIS 2013 questionnaire, so these variables were excluded. However, school environment characteristics associated with stress shown to predict job dissatisfaction and high rates of school turnover, such as student behavior and availability of material resources were included in the models (Loeb *et al.*, 2005; Sass *et al.*, 2011). In TALIS 2013, student behavior was addressed through the school delinquency and violence composite measure and school resources were addressed through the lack of material resources index. Finally, school size was included as a control variable at the school level as several studies noted a significant relationship to teacher job satisfaction (Ingersoll and May, 2012; Shen *et al.*, 2012).

Measuring distributed leadership

Researchers focused on outcomes associated with distributed leadership have used different operational definitions. Hulpia *et al.* (2012) worked to create a holistic operationalization that did not use outcomes for definition but rather actions indicative of distributed leadership. They investigated distributed leadership holistically by including several dimensions indicative of its presence and discussed by Spillane (2006), Gronn (2002), and others in multilevel confirmatory factor analyses. Results indicated that "quality of support, quality of supervision, distribution of support, distribution of supervision, cooperation with the leadership team, and teachers' participative school decision-making" were appropriate measures of distributed leadership (p. 1763). Dimensions significantly positively related to teachers' organizational commitment were teacher perceptions of cooperation within the leadership team, quality of support, and participation in school decision making. These dimensions closely align with items from the TALIS distributed leadership composite measure. As described below, specific survey items from the TALIS measure were selected for their relevance to teachers as opposed to parents or students to comprise an index measure of distributed leadership and are congruent with the three dimensions of distributed leadership that Hulpia *et al.* (2012) found to be significantly related to teachers' organizational commitment.

Perceptions of distributed leadership may vary for teachers and principals. A principal may perceive distributed leadership in the school, but that perception may not be mirrored in teachers' views. Such a discrepancy might influence the relationship between distributed leadership and teachers' job satisfaction. Measures of distributed leadership were included at each level (Table I). In TALIS 2013, the measure provided in the data set for distributed leadership was only at the school level but items in the teacher survey closely mirror the school-level items. Questions addressing parent/guardian and student actions in the original TALIS 2013 distributed leadership measure were excluded because their participation was outside the scope of the current study. For the teacher measure of distributed leadership, an index was created by adding three teacher questionnaire items. A reliability analysis of the teacher-level items revealed high Cronbach's α (0.846).

	Item type	Leadership and teacher job satisfaction	
<i>Independent variables</i>			
Teacher level (level 1): Distributed leadership	Index		
School level (level 2): School-level (principal) distributed leadership	Single items		
School level (level 2): Mean teacher-level distributed leadership	Aggregate		
<i>Dependent variables</i>			
Teacher level (level 1): Teacher professional satisfaction	Index		
Teacher level (level 1): Teacher work satisfaction	Index	133	

Table I.
Key independent and dependent variables

Reliability analysis of the similar school-level items showed low Cronbach's α (0.413), so these items were entered separately at level 2. All of the items for the teacher and principal measures of distributed leadership were rated on a Likert scale of 1 to 4, 1 meaning strongly disagree and 4 meaning strongly agree. Additionally, the teacher-level index of distributed leadership was aggregated to become a school-level variable in order to investigate the relationship of mean teacher-level distributed leadership and teacher job satisfaction.

Job satisfaction

Teachers' job satisfaction may be indicative of retention due to its strong, direct relationship to retention rates (Ladd, 2011; Stockard and Lehman, 2004). Teachers may have different levels of satisfaction with their work and profession, reflecting different patterns of turnover from specific schools vs engagement in teaching. TALIS data include two indices for teacher job satisfaction: teacher satisfaction with the current work environment and teacher satisfaction with the teaching profession. In order to make distinctions between school attrition and attrition from the teaching profession as a whole, these two scales were included as level 1 outcome variables.

Weighting and sample characteristics

Weighted descriptive statistics for teacher-level and school-level variables are provided in Tables II and III. Cases were weighted at the teacher level using the final level 1 teacher weights provided in the TALIS 2013 data set because the outcome of interest was at the teacher level; HLM accounts for the two-stage cluster sampling design where teachers are nested in schools, so other weights were unnecessary (Raudenbush and Bryk, 2002). The teacher sample included a greater number of female teachers than male teachers; 35.4 percent of teachers were male and 64.6 percent were female. Very few teachers lacked teacher training; 99 percent of teachers completed a teacher training program. Most teachers, 94.6 percent, had completed education programs ranked at ISCED level 5A, which is the US equivalent of a bachelor's, master's, or first professional degree (NCES, 2007). The average years of teaching experience for teachers in the sample was 10.36 years and teachers' average age was 36.6 years.

Correlations revealed collinearity between age and years of teaching experience, so only experience was included in the final model (Table IV). These two control variables have been used frequently in the body of literature on teacher retention/attrition in the USA with similar patterns of attrition recorded for each variable (Guarino *et al.*, 2006). The two dimensions of teacher job satisfaction, work and professional satisfaction, were also strongly correlated ($\rho = 0.71$, $SE = 0.01$). Teacher work satisfaction was moderately

Table II.
Descriptive
statistics: teachers

Variable	<i>n</i> ^a	Mean	SD	SE (mean)	SE (SD)
<i>Teachers (level 1)</i>					
Gender	Male	3,697			
	Female	6,673			
Teacher training	With	10,265			
	Without	93			
Education (ISCED level)	Below level 5	115			
	Level 5B	394			
	Level 5A	9,813			
	Level 6	37			
Age	10,370	36.60	9.69	0.09	0.08
Years of teaching experience	10,258	10.36	9.17	0.09	0.10
Teacher self-efficacy	10,302	12.14	2.07	0.02	0.01
Teacher-level distributed leadership	10,257	8.49	1.54	0.02	0.02
Work satisfaction	10,290	11.11	1.86	0.02	0.02
Professional satisfaction	10,290	11.48	1.72	0.02	0.01

Note: ^aRaw numbers without weights applied, all other statistics reflect weights

Table III.
Descriptive statistics:
principals/schools

Variable	<i>n</i> ^a	Mean	SD	SE (mean)	SE (SD)
<i>Principals/schools (level 2)</i>					
School resources (lack of material resources)	Not a problem	374			
	A bit of a problem	57			
	A problem	3			
School SES (percent disadvantaged students)	None	14			
	1-10%	196			
	11-30%	201			
	31-60%	23			
	More than 60%	3			
School size	434	1,256.11	398.79	20.02	62.39
School delinquency and violence	434	6.39	1.06	0.05	0.07
School-level (principal) distributed leadership	434	9.45	1.17	0.06	0.04
Mean teacher-level distributed leadership ^b	484	8.47	0.50	0.03	0.02

Notes: ^aRaw numbers without weights applied, all other statistics reflect weights; ^bschool aggregate

Table IV.
Correlations:
teacher-level
variables, ρ (SE)

	1	2	3	4	5	6
Teacher-level distributed leadership	–					
Work satisfaction	0.55 (0.01)	–				
Professional satisfaction	0.35 (0.01)	0.71 (0.01)	–			
Teacher self-efficacy	0.14 (0.01)	0.16 (0.01)	0.20 (0.01)	–		
Age	0.09 (0.01)	0.11 (0.01)	0.13 (0.01)	0.18 (0.01)	–	
Teaching experience	0.10 (0.01)	0.11 (0.01)	0.11 (0.01)	0.20 (0.01)	0.89 (0.00)	–
Education	–0.02 (0.01)	–0.02 (0.01)	–0.01 (0.01)	–0.04 (0.01)	–0.14 (0.02)	–0.20 (0.02)

correlated with the teacher-level measure of distributed leadership ($\rho = 0.55$, $SE = 0.01$), whereas professional satisfaction was weakly correlated with the same measure ($\rho = 0.35$, $SE = 0.01$). All other teacher-level and school-level variables were weakly correlated (Tables IV and V).

Table V.
Correlations: principal/school-level variables^a, ρ (SE)

	1	2	3	4	5	6	7
School size	–						
School SES (percent disadvantaged students)	–0.35 (0.06)	–					
School resources (lack of material resources)	–0.06 (0.04)	0.13 (0.08)	–				
School delinquency and violence	–0.16 (0.04)	0.16 (0.07)	0.13 (0.07)	–			
Mean teacher-level distributed leadership	0.14 (0.07)	–0.09 (0.08)	–0.11 (0.08)	–0.10 (0.08)	–		
Staff decision-making (school-level distributed leadership)	0.05 (0.08)	0.05 (0.10)	0.00 (0.08)	–0.03 (0.12)	0.23 (0.08)	–	
Shared decision-making (school-level distributed leadership)	0.00 (0.10)	–0.04 (0.07)	–0.12 (0.09)	–0.02 (0.11)	–0.09 (0.07)	0.13 (0.10)	–
Collaborative school culture (school-level distributed leadership)	0.14 (0.09)	–0.15 (0.07)	–0.06 (0.07)	–0.23 (0.09)	0.27 (0.07)	0.44 (0.10)	0.10 (0.09)

Note: ^aReflects TALIS 2013 Core survey population at ISCED Level 2

To determine whether the Singapore MOE's policy emphasis on school autonomy was reflected in the statements rated by principals on the principal questionnaire, frequencies for the three school autonomy indices were run. Results indicated that all schools in the sample were rated either mixed autonomous or autonomous schools in regard to instructional policies (Table VI). A majority of schools lacked autonomy for budgeting and over half lacked staffing autonomy. While the MOE school autonomy policies were reflected in the data for curriculum and instruction, this was not the case for budgeting and staffing.

HLM models

Two sets of three hierarchical linear models were run during the analysis: one set with teachers' work satisfaction as the outcome variable and one set with teachers' professional satisfaction as the outcome variable. The first model was a fully unconditional model (one-way ANOVA random effects model with no level 1 or level 2 predictors) to test for variation in teachers' job satisfaction within and between schools. The second model was a random coefficient model with level 1 predictors added to test for significant relationships among predictors and outcome variables and to determine whether variation existed between schools for each. The third model was an intercepts- and slopes-as-outcomes model with both level 1 and level 2 predictors to investigate the relationships of level 2 predictors with outcome variables and to see if level 2 predictors moderated relationships among level 1 predictors and outcome variables (the slopes). Continuous level 1 predictors were group-mean centered and categorical variables were uncentered in the partially and fully conditional models. Grand-mean centering of level 2 predictors was used in the

Table VI.
School autonomy in Singapore

	No autonomy		Mixed autonomy		Autonomy	
	<i>n</i> ^a	Percent	<i>n</i> ^a	Percent	<i>n</i> ^a	Percent
Staffing autonomy	247	55.08	175	38.94	27	5.98
Budgeting autonomy	384	85.59	50	11.07	15	3.34
Instructional autonomy	–	–	233	52.37	212	47.63

Note: ^aWeighted

fully conditional models because the study focused on relationships of level 1 predictors with outcome variables. In fully conditional models, group-mean centering of level 1 predictors allows for testing whether level 2 predictors moderate relationships between level 1 predictors and outcome variables (Enders and Tofghi, 2007).

Results

Model building

Before running final models for each outcome variable, control variables were individually entered into the level 1 regression equation after the deviance statistic, or model fit test was evaluated and the more complex model was compared to the previous model. This process revealed that education level and teacher self-efficacy did not contribute to explaining variation in teacher professional satisfaction at level 1, and school SES and school resources did not contribute to the model at level 2. For teacher work satisfaction, education at level 1 and school delinquency, violence, and resources at level 2 did not significantly contribute to the model. These control variables were excluded from final models.

Teacher-level and principal-level distributed leadership were entered after relevant control variables were already included in the model. For both dimensions of teacher job satisfaction, teacher-level distributed leadership passed the model fit test. Conversely, distributed leadership at level 2 was more complex. Because factor analysis revealed a low Cronbach's α statistic for the principal distributed leadership index, the three items comprising the index were modeled on the intercept separately. With teacher work satisfaction as the outcome variable, the collaborative school culture and staff decision-making variables passed the model fit test, but shared decision making did not. Additionally, when the aggregate teacher-level distributed leadership variable was added at level 2, only the collaborative school culture variable significantly contributed to explaining variation in work satisfaction. For professional satisfaction as the outcome, staff decision making was the only principal measure of distributed leadership that passed the model fit test. However, when controlling for aggregate teacher-level distributed leadership, this variable no longer contributed to the model. Each level 2 control variable was modeled on the slopes, but none passed the model fit test for either dimension of job satisfaction. Final models are displayed in Figure 1.

<p>Level 1 Model</p> $\text{Work Satisfaction}_{ij} = \beta_{0j} + \beta_{1j} * (\text{Gender}_{ij}) + \beta_{2j} * (\text{Experience}_{ij}) + \beta_{3j} * (\text{Teacher Training}_{ij}) + \beta_{4j} * (\text{Self-Efficacy}_{ij}) + \beta_{5j} * (\text{Teacher-Level Distributed Leadership}_{ij}) + r_{ij}$ <p>Level 2 Model</p> $\beta_{0j} = \gamma_{00} + \gamma_{01} * (\text{School Size}_j) + \gamma_{02} * (\text{School SES}_j) + \gamma_{03} * (\text{MeanTDL}_j) + \gamma_{04} * (\text{Principal-Level Distributed Leadership}_j) + u_{0j}$ $\beta_{1j} = \gamma_{10}$ $\beta_{2j} = \gamma_{20}$ $\beta_{3j} = \gamma_{30}$ $\beta_{4j} = \gamma_{40} + u_{4j}$ $\beta_{5j} = \gamma_{50} + u_{5j}$	<p>Level 1 Model</p> $\text{Professional Satisfaction}_{ij} = \beta_{0j} + \beta_{1j} * (\text{Gender}_{ij}) + \beta_{2j} * (\text{Experience}_{ij}) + \beta_{3j} * (\text{Teacher Training}_{ij}) + \beta_{4j} * (\text{Teacher-Level Distributed Leadership}_{ij}) + r_{ij}$ <p>Level 2 Model</p> $\beta_{0j} = \gamma_{00} + \gamma_{01} * (\text{School Size}_j) + \gamma_{02} * (\text{School Delinquency and Violence}_j) + \gamma_{03} * (\text{MeanTDL}_j) + u_{0j}$ $\beta_{1j} = \gamma_{10}$ $\beta_{2j} = \gamma_{20}$ $\beta_{3j} = \gamma_{30}$ $\beta_{4j} = \gamma_{40} + u_{4j}$
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Figure 1.
Final models for work and professional satisfaction

Fully unconditional models

The fully unconditional model for teachers' work satisfaction revealed an average of 11.11 for work satisfaction, so teachers' work satisfaction in Singapore tended toward the higher end of the scale (Table VII). Within-school variance for teachers' work satisfaction was $\sigma^2 = 3.20$ and between-school variance was significant, $\tau = 0.24$, $p < 0.001$. The intraclass correlation was 0.07 ($0.24 / (3.20 + 0.24)$); 7 percent of the variation in teachers' work satisfaction was between schools. For teachers' professional satisfaction, the average across schools was 11.49, again tending slightly toward the higher end of the scale (Table VIII). Within-school variance for professional satisfaction was $\sigma^2 = 2.85$ and between-school variance was significant, $\tau = 0.08$, $p < 0.001$. The percent variation in professional satisfaction between schools was 2.7 percent ($0.08 / (2.85 + 0.08)$). Significant variation between schools for both dimensions of job satisfaction showed that HLM was appropriate as it enabled analysis of level 2 predictors that explained differences between schools.

Final two-level models

Final models are displayed in Figure 1 and results are provided in Tables IX and X. Analysis revealed that gender, experience, and teacher training were significantly related to work and professional satisfaction. Female teachers were less satisfied at their workplace and the profession than male teachers, and the strength of the relationship was similar for each dimension of job satisfaction ($B = -0.18$, $p < 0.001$). As teachers' years of teaching experience increased, so did satisfaction; this relationship was similar for both professional satisfaction ($B = 0.02$, $p < 0.001$) and work satisfaction ($B = 0.01$, $p < 0.001$). Teachers who completed teacher training were less satisfied with their work than teachers without teacher training, but the relationship was slightly stronger for professional satisfaction ($B = -0.59$, $p < 0.01$) than work satisfaction ($B = -0.46$, $p < 0.01$). After model fit tests, teacher self-efficacy was only included in the model for work satisfaction and the relationship was positive; as teacher self-efficacy increased, so did work satisfaction ($B = 0.06$, $p < 0.001$).

School-level controls differed slightly by job satisfaction dimension. As school size increased, work and professional satisfaction also increased, but coefficients were very small. School SES was significantly negatively related to work satisfaction, but did not contribute to the model for professional satisfaction. That is, as the percentage of disadvantaged students in the school increased, work satisfaction decreased ($B = -0.08$, $p < 0.05$). School delinquency and violence was not significantly related to professional satisfaction ($p > 0.05$) and did not contribute to the model for work satisfaction.

	Coefficient	SE	t-Ratio	p
Fixed effects				
Intercept (teacher work satisfaction)	11.11	0.03	354.39	< 0.001
Random effects	Variance	SD	χ^2	p
Between-school variance	0.24	0.49	1,111.32	< 0.001
Within-school variance	3.20	1.79		
Reliability (teacher work satisfaction)	0.61			

Table VII.
Fully unconditional
model for teacher
work satisfaction

	Coefficient	SE	t-Ratio	p
Fixed effects				
Intercept (teacher professional satisfaction)	11.49	0.02	490.20	< 0.001
Random effects	Variance	SD	χ^2	p
Between-school variance	0.08	0.28	687.87	< 0.001
Within-school variance	2.85	1.69		
Reliability (teacher professional satisfaction)	0.37			

Table VIII.
Fully unconditional
model for teacher
professional
satisfaction

Table IX.
Fully conditional
model for teacher
work satisfaction

Fixed effects		Coefficient	SE	t-Ratio	p
Intercept		11.67	0.18	65.55	< 0.001
<i>Teacher-level variables</i>					
Gender (female)		-0.18	0.03	-5.21	< 0.001
Experience		0.01	0.00	4.41	< 0.001
Teacher training (completed)		-0.46	0.18	-2.57	0.001
Teacher self-efficacy		0.06	0.01	7.38	< 0.001
Teacher-level distributed leadership		0.63	0.01	42.12	< 0.001
<i>School-level variables</i>					
School size		0.00	0.00	3.03	0.003
School SES (% disadvantaged)		-0.08	0.03	-2.24	0.025
Mean teacher-level distributed leadership		0.79	0.05	17.63	< 0.001
Collaborative school culture		0.14	0.05	3.00	0.003
Random effects		Variance	df	χ^2	p
Between-school variance (intercept)		0.09	426	805.13	< 0.001
Between-school variance (teacher self-efficacy slope)		0.00	430	477.95	0.055
Between-school variance (teacher-level distributed leadership slope)		0.03	430	716.81	< 0.001
Within-school variance		2.17			

Table X.
Fully conditional
model for teacher
professional
satisfaction

Fixed effects		Coefficient	SE	t-Ratio	p
Intercept		12.18	0.19	65.21	< 0.001
<i>Teacher-level variables</i>					
Gender (female)		-0.18	0.04	-4.88	< 0.001
Experience		0.02	0.00	8.62	< 0.001
Teacher training (completed)		-0.59	0.19	-3.16	0.002
Teacher-level distributed leadership		0.39	0.01	27.83	< 0.001
<i>School-level variables</i>					
School size		0.00	0.00	2.52	0.012
School delinquency and violence		-0.04	0.02	-1.88	0.061
Mean teacher-level distributed leadership		0.37	0.04	8.55	< 0.001
Random effects		Variance	df	χ^2	p
Between-school variance (intercept)		0.06	427	650.14	< 0.001
Between-school variance (teacher-level distributed leadership slope)		0.02	430	563.78	< 0.001
Within-school variance		2.43			

The key predictor variable at level 1, teacher-level distributed leadership, was significantly positively related to teacher satisfaction after controlling for other variables, and this relationship was stronger for work satisfaction ($B = 0.63$, $p < 0.001$) than professional satisfaction ($B = 0.39$, $p < 0.001$). At level 2, aggregated teacher-level distributed leadership was also positively related to job satisfaction, and, similarly, the relationship was stronger for work satisfaction ($B = 0.80$, $p < 0.001$) than professional satisfaction ($B = 0.37$, $p < 0.001$). The principal-level distributed leadership variable, staff participation in decision making, was significantly positively related to professional satisfaction ($B = 0.10$, $p < 0.05$) and work satisfaction ($B = 0.17$, $p < 0.01$). However, after controlling for aggregated teacher-level distributed leadership, it was no longer significant in either model ($p > 0.05$); the average teacher perceptions of distributed leadership in the school mediated principal perceptions of staff participation in decision making. Principal perceptions of a collaborative school culture remained significant for work satisfaction after controlling for school

mean distributed leadership ($B = 0.14$, $p < 0.01$), but were not significant at all for professional satisfaction.

Modeling of school-level predictors on the level 2 slopes was limited because significant variance between schools remained for only the teacher-level distributed leadership slopes. Additionally, as noted above, several variables failed to account for variation according to model fit tests. School-level predictors explained 68 percent of the between-school variance in teachers' work satisfaction ($((0.28 - 0.09)/0.28)$), and level 2 predictors explained 40 percent of the variance in professional satisfaction between schools ($((0.10 - 0.06)/0.10)$). Additional variance remained unexplained for both work and professional satisfaction ($p < 0.001$).

Discussion and implications

Results confirmed the first hypothesis: distributed leadership was significantly related to both dimensions of job satisfaction. However, the relationship was stronger for work satisfaction than professional satisfaction. Distributed leadership may be more important for teachers' satisfaction with their specific school site of employment and less relevant for their perceptions of the teaching profession as a whole. Teachers may isolate their experience with the leadership quality at specific schools from their perceptions of the field of teaching because the teaching profession is defined amidst multiple work environments.

The second hypothesis was not supported. There was no significant between-school variation for the relationships between individual teacher characteristics and job satisfaction, so testing for moderation of school-level distributed leadership was irrelevant. However, the aggregate measure of distributed leadership was significant for teachers' job satisfaction and more significant for work than professional satisfaction after accounting for individual teacher characteristics. Principal perceptions of distributed leadership were less consistently significant. Principal perceptions of staff decision making were significant for job satisfaction before the aggregate variable was included in the model. The only principal-level measure of distributed leadership that was significant after the addition of the aggregate variable was the indicator for collaborative school culture, and it was only significant for work satisfaction.

The significant positive relationship between teachers' perceptions of distributed leadership and both dimensions of teachers' job satisfaction beyond individual teacher characteristics is a new finding in the Singapore schooling context. Moreover, the significance of both individual teachers' perceptions and average teacher perceptions is instructive. Their perceptions played a greater role in predicting job satisfaction than principal perceptions. This finding is consistent with research by Boyd *et al.* (2011) in which teacher perceptions of leadership were the most significant predictors of teacher retention beyond other individual teacher and school characteristics. The variation in significance between teacher and principal measures of distributed leadership suggests that there may be incongruity between principal and teacher perceptions. Perceptions may not align with actions, and principals' intentions to facilitate distributed leadership in the workplace may not be completely actualized during their administration. Conversely, the stronger associations for teacher measures of distributed leadership may indicate that the role of the principal in facilitating distributed leadership in the school is less prominent than that of other actors or the collective efforts of other actors within the school environment. Such an inference may explain why past research by Hulpia *et al.* (2011) revealed teacher perceptions of leadership quality as the most significant predictor of commitment, with the influence of individual leaders bearing less significance, and research by Devos *et al.* (2014) that showed principal leadership was indirectly related to teacher commitment via the support of assistant principals and teacher leaders, leadership cooperation, and teachers' participation in decision making. The stronger significance of the aggregate distributed leadership

variable may also reflect conceptualizations of distributed leadership highlighting the importance of collaboration and mutual agreement on goals (Gronn, 2002; Spillane, 2006). The aggregate measure may be more reflective of distributed leadership and collective views than the measure derived from individual principal surveys.

After controlling for other school characteristics, school SES was significantly related to teachers' work environment satisfaction, not professional satisfaction. Teacher work environment satisfaction was lower when school composition included a higher percentage of students from disadvantaged backgrounds, but school SES was not as significant as distributed leadership in the final model, mirroring study results from Boyd *et al.* (2011), Grissom (2011), and Ladd (2011) that documented leadership quality as the strongest predictor of retention. The greater significance of distributed leadership has positive implications for teacher retention at low-income and high-minority schools, as altering leadership quality may be more accessible than financially restructuring schools.

The autonomous school environment promoted by the Singapore MOE's recent policies may account for the strengths and weaknesses of the tested relationships presented in this paper. A similar analysis of TALIS 2013 data from other countries, with a closer look at the school autonomy index, could provide more information. It may be helpful to test for mediation and moderation effects of the school autonomy index on the relationships among teacher and principal perceptions of distributed leadership and teachers' job satisfaction to investigate influence of policy climate on leadership quality in schools.

Some limitations should be noted. Causal inferences cannot be made from this study because data were cross-sectional, representing teacher and principal perceptions at one point in time. Teachers' actual retention rates were not included in the study. While teachers' job satisfaction is a strong predictor of retention, it does not represent actual retention rates. Data also reflected a greater level of instructional autonomy than budgeting and staffing autonomy in the Singapore educational landscape, so distinctions should be noted in the type of autonomy granted to schools when making cross-country comparisons.

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