Chapter 32
Academically At-risk Adolescents in Singapore: The Importance of Teacher Support in Promoting Academic Engagement

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Abstract The purpose of this study was to examine the associations of teacher support and teacher–student relationship with the academic engagement of 1469 Secondary 1 (Grade 7) students in Singapore. The students were identified as academically at risk based on the results of a national test given at the end of Primary 6 (Grade 6). Teacher autonomy and competence support, along with trust accorded to teachers, were found as significant positive predictors of the students' academic engagement. In general, alienation of students from teachers and quality of students' communication with teachers did not emerge as significant predictors of academic engagement. It was also found that, compared to the students in the high-risk group, the students in the low-risk group tended to be more engaged in class and perceived higher levels of trust and competence support from their teachers. There was no significant difference in the degree of teacher autonomy support that was reported by low-risk and high-risk students. However, teacher autonomy support was found to be the strongest predictor of academic engagement for the entire sample of at-risk students, as well as in separate analyses focusing on high- and low-risk students. Implications for future research and school practice are discussed.

Introduction

Self-determination theory (SDT) claims that the satisfaction of the three basic psychological needs—autonomy, competence, and relatedness—is essential for humans to thrive in varied life domains (Deci & Ryan, 2000). Competence pertains to being

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effective in carrying out needed actions to achieve intended outcomes; relatedness refers to developing secure connections with others; and autonomy is associated with being able to initiate and regulate one's own actions (Deci, Vallerand, Pelletier, & Ryan, 1991). Social contexts that facilitate fulfillment of these basic needs enhance overall well-being of individuals and help them to achieve important life goals.

In educational settings, a multitude of studies (e.g., Brewster & Bowen, 2004; Klem & Connell, 2004; Skinner, Furrer, Marchand, & Kindermann, 2008) have demonstrated that fostering autonomy, competence, and relatedness is crucial in promoting positive learning outcomes among students. As students spend a significant amount of time in school, teachers become important adult figures in their lives (Cemalcilar, 2010) and, thus, play a key role in addressing students' needs and attaining optimal levels of academic functioning. This role is assumed to be more prominent for academically at-risk students, who usually come from disadvantaged homes, where the quality of familial support is usually low (Hamre & Pianta, 2001).

Teacher Support and Student Engagement

Providing support for autonomy, competence, and relatedness has been found to correlate with adaptive educational outcomes, notably in the areas of academic engagement and achievement (Brewster & Bowen, 2004; Klem & Connell, 2004; Skinner et al., 2008). Engagement pertains to "active, goal directed, flexible, constructive, persistent, and focused interactions with the social and physical environments" (Furrer & Skinner, 2003, p. 149). In relation to academic activities, engagement has been classified into three types: namely, behavioral, emotional and cognitive engagement. Behavioral engagement pertains to involvement in learning activities, paying attention (Skinner et al., 2008; Wang & Eccles, 2012), exercising positive behavior, and attending school (Wang & Eccles, 2012). Emotional engagement connotes positive emotional states, such as enthusiasm, interest, and enjoyment (Skinner et al., 2008) and sense of belonging in school (Wang & Eccles, 2012). Cognitive engagement connotes the use of self-regulated and metacognitive learning strategies (Wang & Eccles, 2012), active linking of new ideas with existing knowledge, and understanding of the topics being learned (Wolters, 2004). Several studies have shown that students who are engaged in class are less likely to drop out from schools (e.g., Finn & Rock, 1997) and more likely to have higher educational achievement (Finn & Rock, 1997; Fredricks, Blumenfeld, & Alison, 2004; Skinner & Belmont, 1993), while students with low levels of engagement are at risk for a variety of long-term adverse consequences, including disruptive behavior in class, absenteeism, and dropping out of school (Klem & Connell, 2004).

Autonomy Support, Competence Support, and Academic Engagement Teachers can develop students' sense of autonomy and competence in varied ways. Autonomy can be supported by considering students' views, identifying and supporting students' needs and choices (Jang, Reeve, & Deci, 2010), and providing opportunities for them to exercise self-directedness in carrying out learning activities (Brophy,

2010). Competence can be enhanced by helping students feel or realize that they are capable of doing particular tasks (Standage, Duda, & Ntoumanis, 2005), giving appropriate feedback (see review of Yeh, 2010), and providing optimal structure (Skinner & Belmont, 1993). Structure can be provided by presenting clear expectations and goals and by matching teaching approaches with students' abilities (Skinner & Belmont, 1993).

A substantial body of literature, which was based mostly on Western samples, upholds the view that teacher competence and autonomy support have strong links with elementary and/or secondary students' academic engagement (Jang et al., 2010; Klem & Connell, 2004; Skinner et al., 2008). Skinner et al. reported that both types of teacher support predicted students' gains in behavioral and emotional engagement and drop in disaffection. Klem and Connell (2004) reported that stronger autonomy and competence support from teachers were positively associated with school engagement indicators (as reported by teachers and students) that predominantly represented the behavioral domain. Jang et al. (2010) concluded that teacher autonomy support positively influenced a broader range of engagement dimensions (behavioral, emotional, and cognitive), but the influence of competence support was restricted to behavioral engagement.

Some cross-cultural researchers (e.g., Iyengar & Lepper, 1999; Markus & Kitayama, 1991) argue that Asian societies, which are commonly understood to reflect a more collectivistic, relationalistic, and/or authority-centric cultural orientation (Ho & Crookall, 1995), may ascribe lower priority to the satisfaction of autonomy, as compared to Western societies that are more associated with individualistic cultural orientations. In the context of education, there have been claims that the importance placed to an "interdependent self" in collectivist cultures (Markus & Kitayama, 2003, p. 227) may not be compatible with the notion of an autonomous learner that Western cultures associate with independent and critical thinkers (see, e.g., Murphy, 1987). Thus, the literature seems conflicted with regard to the importance of autonomy support for students in collectivist cultures. Some studies have shown positive effects of autonomy support (e.g., D' Ailly, 2003; Jang, Reeve, Ryan, and Kim 2009), while other studies seemed to question its utility (see King & McInerney, 2014 for a review). Moreover, the strong endorsement of high academic aspirations among students in Asian societies (Biggs, 1994; Schneider & Lee, 1990) would also warrant the view that competence support could be a more salient factor than autonomy support in promoting high academic functioning and well-being.

Teacher–student Relatedness and Academic Engagement To address students' need for connectedness in school settings, cultivation of teacher–student relatedness is paramount (Skinner & Belmont, 1993). Openness during interactions and gestures showing care, trust, and confidence are important in developing high-quality teacher–student relationships (Murray & Zvoch, 2011). A rapidly expanding evidence base indicates that teacher–student relatedness influences students academically (e.g., Furrer & Skinner, 2003; Hamre & Pianta, 2012; Hughes & Kwok, 2007; Short, 2013), as well as psychologically (Furrer & Skinner, 2003; Klem & Connell, 2004; Osterman, 2000). Hattie's (2009) landmark study, which synthesized the results of more than 800 educational studies, ranked teacher–student relationship in

the top ten most influential determinants of students' academic achievement. Other researchers concluded that positive teacher–student relationship is associated with students' self-esteem, sense of competency, and emotional connectedness (Furrer & Skinner, 2003; Osterman, 2000) and emotional engagement (Short, 2013). Specifically, teachers' trust in students, as well as parents, was found to be a significant positive predictor of students' academic engagement (Brewster & Bowen, 2004; Chen, 2005) and achievement (Goddard, Tschannen-Moran, & Hoy, 2001).

The emphasis on interdependence and the will to belong to a group that is common in Asian societies may suggest that positive relationships can play a particularly important role in promoting positive academic outcomes. Chen and Astor (2011) identified poor teacher–student relationships and low behavioral engagement as powerful factors associated with Taiwanese elementary students' perpetration of school violence. In this study, poor teacher–student relationships were operationalized in terms of students' perceptions of their teachers' distrust in them, dislike or mocking of them, and enacting unfair punishment toward them—all behaviors pointing to a general sense of alienation and low levels of trust between the student and the teacher.

The importance of students' perceived trust from teachers among Asian students in promoting positive schooling outcomes (e.g., academic motivation and achievement) was further supported by Lee's study (2007), which involved Korean middle school students. In this study, the author found that students' sense of trust in their teachers—measured by a combination of cognitive and affective trust in their teachers (i.e., teachers' knowledge in their subject and teachers caring about them and looking out for them in school)—emerged as a significant predictor of school success (i.e., positive school adjustment, academic motivation, and performance). The author also suggested that fostering teacher–student trust is of particular pertinence to students in high-performing education systems such as Korea, where general distrust in schools and teachers, especially on the development of essential competencies among secondary school students, has heightened students' anxiety, maladjustment, and confusion (Lee, 2007). While numerous studies focusing on Western student samples have shown the importance of teacher–student trust relationships, especially affective trust, in fostering positive learning outcomes (e.g., Hughes & Kwok, 2007; Roorda, Koomen, Spilt, & Oort, 2011), empirical studies of this nature are sorely lacking in relation to other cultures, particularly Asian societies.

Teacher Support for Autonomy, Competence, and Relatedness for At-risk Students Prior research highlighting the importance of teachers' roles in promoting students' engagement and other learning outcomes has focused on mainstream samples of students (Hamre & Pianta, 2006, 2012). However, there is an emerging literature base suggesting that teacher support may be particularly critical for academically at-risk students, who are noted to manifest lower levels of participation in academic activities (Finn, 1993; Klem & Connell, 2004). Teacher behavior in the classroom may serve as an aggravating or ameliorating factor for students who have lower levels of engagement and achievement (Chen & Astor, 2011). This notion is entwined with the reported reciprocal association between the quality of

teacher support and student engagement (Hughes & Kwok, 2007; Skinner & Belmont, 1993). Some teachers may respond negatively to students' lack of engagement in class as these students may make them feel less liked or less competent; as a result, teachers may provide less feedback, implement more control measures that inhibit students' autonomy, or undermine teacher–student relatedness by spending less time with these students (Skinner & Belmont, 1993). The parallel upshot, however, is that some teachers may choose to provide more support for disengaged students (Klem & Connell, 2004; Skinner & Belmont, 1993); these students, in turn, may feel that their needs are met and, accordingly, become more active in class. Teachers who convey emotional warmth and acceptance and take time to communicate to students stimulate the positive relational processes that have been reported to maintain students' academic and social pursuits, which in turn lead to better grades and more positive peer relationships (Hamre & Pianta, 2006, 2012). And teachers' provision of emotional (e.g., actions considering students' needs and showing positive regard to students) and instructional (e.g., giving feedback, asking open-ended questions) support was found to be associated with positive teacher-student relatedness and achievement scores of children facing risk of school failure (Hamre & Pianta, 2005).

The multitude of risk factors faced by academically at-risk students further point to the potential benefits that they can gain from enhanced teacher autonomy, competence, and relatedness support, although variation in the relative effects of these forms of support may be observed. Low-performing students have been shown to be low in self-regulation (VanZile-Tamsen & Livingston, 1999) and, thus, are likely to gain more benefits from autonomy-supportive teachers compared to students with better self-regulation skills, such as low-risk students (based on Black & Deci, 2000). Students facing high risk of continued low achievement may also be more sensitive to competence support than their low-risk counterparts noting that the former tend to have more negative experiences with competence issues. Teachers' influence on students' academic outcomes is also likely to be more linked with the quality of competence support on students than with relatedness and autonomy support; influencing students' achievement via strong relatedness support is likely to be the realm of family and friends than of teachers (see Legault, Green-Demers, & Pelletier, 2006). However, parents' influence may decline when students approach adolescence (Laursen & Collins, 2009); thus, students' relatedness with teachers could be more valuable than autonomy and competence support in buffering the negative effects of academic, as well as life, stressors (Murray & Zvoch, 2011).

Purpose of This Study

Our review of the extant literature suggests that there remains a need for more studies to shed light on the applicability of SDT to a broader and more diverse sample of Asian students, such as students at risk of continued low achievement. A more nuanced understanding of the nature and related impact of varied forms of teacher

support on non-Western cultural societies is needed. To address this gap, the present study examines the quality of teacher–student relatedness, teacher competence and autonomy support, and academic engagement of a sample of students who were attending Singapore schools and were considered as academically at risk because of their lower scores (relative to the cohort mean) in a national achievement test given at the end of primary education. In examining teacher–student relatedness and academic engagement, their respective dimensions were considered separately rather than together (i.e., as omnibus variables). Variations in the associations between the dimensions of each construct were detected in previous studies that adopted a similar analytic approach (see Jang et al., 2010; Murray & Zvoch, 2011). In adopting this approach, we hoped to generate fine-grained insights that can illuminate teacher-supported conditions leading to adaptive outcomes among at-risk students.

Specifically, this study aims to answer the following research questions:

RQ1: Do the quality of teacher–student relationship and teacher support (autonomy support and competence support) predict academic engagement of academically at-risk students?

RQ2: Are the associations among teacher–student relationship, teacher support, and academic engagement invariant across students facing low risk and high risk of continued low achievement?

RQ3: Is there a significant difference in the quality of teacher–student relationship, teacher support, and academic engagement between high-risk and low-risk groups?

On the basis of the ideas presented in our review of related studies, we formulated the following hypotheses:

H1: Teacher competence and autonomy support, teachers' trust in students, and teacher–student communication would serve as positive predictors of academic engagement; however, students' perceived alienation from teachers was expected to be a significant negative predictor of academic engagement.

H2: The relationships mentioned in H1 would be invariant across students facing low risk and high risk of continued low achievement.

H3a: Academic engagement, the quality of student-perceived teacher support, teacher–student communication, and teachers' trust in students would be significantly higher for low-risk than high-risk students.

H3b: Teacher–student alienation would be significantly higher for the high-risk than for the low-risk students.

In exploring the interaction among teacher support and risk levels within an Asian context, we hope to generate richer insights into the usefulness of SDT by extending its range of application.

Methodology

Participants

A total of 1469 Secondary 1 (Grade 7) students from 23 government schools in Singapore participated in the study. Most of the participating schools ($n = 21$) were selected using cluster random sampling: Six schools were randomly selected from each of the four school clusters that were formed according to geographical location (i.e., North, South, West, and East); two schools were selected via convenience sampling to replace randomly selected schools that declined our invitation. For each school, about two to three classes of students were allowed by the school principals to participate in the study. The student sample comprised 63 % males and 37 % females. The students' age ranged from 11 to 14 years, with 89 % being 12 to 13 years old. Based on fathers' ethnicity, about 46 % of the students were Chinese, 28 % were Malays, 9 % were Indians, and 8 % were from other ethnic or racial backgrounds, and the ethnic information of the rest was not given by the schools.

Most students in Singapore are placed into three different streams—Normal Academic (NA), Normal Technical (NT), and Express—on the basis of their performance on a national examination given at the end of their elementary school years (Ministry of Education [MOE], 2014). The present sample comprised 927 and 497 students from the NT and NA streams, respectively. Students from the Express stream were not included in this study. The national examination scores of the NT students in the current sample ranged from 25 to 166 (median = 135), and those of the NA students ranged from 139 to 229 (median = 172). We regarded the NA and NT students as academically at risk, considering their relatively lower initial achievement during their entry to secondary school compared to that of Express students (based on Cappella & Weinstein, 2001).

Measures

Noting the indications of the domain specificity of academic engagement found in prior studies (e.g., Martin, 2008), all measures that we used in this study were focused on the English subject domain. Using a domain-specific approach is likely to generate more precise insights that would be useful to educators and stakeholders in developing targeted strategies aiming to help academically at-risk students who typically face language difficulties.

Teacher Autonomy and Competence Support We used 6 of the 15 items from the Learning Climate Questionnaire (Williams & Deci, 1996) to assess the teacher autonomy support (TAS). The TAS tapped the students' perceptions of the degree to which their English teachers recognize their capabilities, provide choices, and encourage them to express their views. An example of a TAS item is *I feel that my English teacher provides me choices and options*. The scale items required responses

ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Williams and Deci reported a unidimensional structure and good psychometric properties of the scale.

Teacher competence support (TCS) was assessed by four items that were based on Jang et al.'s (2010) bipolar scale. TCS was designed to tap students' perceptions of structure (in the form of clear goals and instruction), feedback, and appropriate tasks provided by their teachers. The four items were reworded into Likert-type items to resemble the TAS items. A sample TCS item is *My English teacher provides clear instructions that I understand*. The response scale used in TAS was also used for the TCS items, for consistency.

For the current sample, Cronbach's alpha coefficients for perceived English teacher autonomy (.97) and competence (.96) support were found very high.

Academic Engagement We used the child-report version of the behavioral engagement (BENG) and emotional engagement (EENG) scales of Skinner, Furrer, Marchand, and Kindermann (2008). Each dimension is composed of five items that required a response scale ranging from 1 (*almost never or never true*) to 4 (*almost always or always true*). BENG items (e.g., *I try hard to do well in school*) assessed the level of students' effort, attention, and persistence during class activities. EENG items (e.g., *Class is fun*) pertained to the degree of students' enthusiasm and enjoyment during learning activities. Earlier studies (Furrer & Skinner, 2003; Skinner et al., 2008) reported good internal consistencies (.72 to .86) and provided evidence for convergent validity of the behavioral and emotional engagement scales. For the current sample, Cronbach's alpha coefficients of emotional engagement and behavioral engagement subscales associated with English classes were found highly satisfactory—.91 and .93, respectively.

For cognitive engagement (CENG), we adapted four items from Wolters's (2004) learning strategy questionnaire (see also Reeve & Tseng, 2011). These items assessed the students' active role in learning and making meaning. For example, *I make up my own examples to help me understand important concepts*. Cronbach's alpha reliability of the scale was .92.

Teacher–Student Relatedness We used the Inventory of Teacher–Student Relatedness (ITSR, Murray & Zvoch, 2011) in determining the quality of teacher–student relatedness. It comprises three dimensions—*communication* (COMM), *trust* (TRUST), and *alienation* (ALIEN). COMM (five items) reflected students' openness in communicating their ideas with their English teachers (e.g., *I tell my English teacher about my problems and troubles*). TRUST (five items) pertained to students' perceptions of care, acceptance, and trust accorded to them by their English teachers (e.g., *My English teacher trusts me that I am good even if I don't realize it*). ALIEN (four items) tapped students' emotional detachment from their English teachers (e.g., *I don't believe what my English teacher says)*.

The students were asked to rate their relationship with their English teachers using a four-point rating scale ranging from *1 (almost never or never true)* to *4 (almost always or always true)*. Based on the responses of the present sample, Cronbach's alpha reliability for the subscales ranged from .76 to .90.

Academic Achievement To group the students according to various risk levels, we used their end-of-year school grades in English and their reading achievement. The latter was measured using the Progressive Achievement Test in Reading (PAT-R) Level 5 that was developed by the Australian Council for Educational Research (2014). PAT-R was found to have good psychometric properties using Australian students of similar age as the normative sample (Fogarty, 2007). We adapted the approach used by Waxman, Huang, and Padron (1997) and Finn and Rock (1997) in grouping academically at-risk students to different levels. *Low-risk* students ($n = 399$) had school grades of C and higher and reading achievement above the 11th percentile of the normative sample. *High-risk* students ($n = 396$) had grades below C and reading achievement at or below the 11th percentile of the normative sample. The rest of the students ($n = 674$) were classified into the *moderate-risk* group.

Data Collection

The participants and their parents were requested to sign assent and consent forms, respectively, prior to the start of the data collection. Members of the research team administered the combined survey instruments (30 minutes) and achievement test (40 minutes) via online platform.

Data Analysis

Preliminary Analysis We used IBM SPSS 21.0 in conducting our data analyses. Out of the 1485 students in the original list of participants, 16 cases with 40 % or more of missing responses were deleted (based on Hair, Black, Babin, & Anderson, 2010). Most of these cases were absentees during some of the scheduled data collection periods. The missing responses for the remaining cases were assessed. At most, only 1.2 % of the responses per variable were found missing. Noting the small number of missing data and the possibility that data could be missing at random, the expectation–maximization algorithm was deemed as an appropriate imputation technique to replace missing values (based on Hair et al., 2010).

Before conducting the pertinent statistical analyses, relevant assumptions associated with multivariate statistical analyses were assessed based on the suggestions of Hair et al. (2010). Examination of Q–Q plots for each dimension of the constructs mentioned did not show gross violations of the normality assumption although we found that many of our variables were positively skewed. Considering the large sample size, we looked at z-scores with values of 4 and higher to identify univariate outliers: Only 12 outlying cases were identified using this cutoff value. Similarly, 47 of the students were considered as potential multivariate outliers, with responses associated with significant Mahalanobis distance ($p < .001$). There were no cases

that were found extreme outliers in a sufficient number of variables to be considered for deletion.

Assessing the Measurement and Structural Models The AMOS program in SPSS 21.0 was used in conducting confirmatory factor analysis (CFA, Arbuckle, 2012). The CFA conducted used maximum likelihood estimation to test the hypothesized structure of the variables. Multiple indices were considered in assessing and comparing the goodness of fit of five factorial models: RMSEA values of less than 0.6, SRMR values less than .08, and CFI values close to .95 were used as thresholds in representing adequately fitting model (Hu & Bentler, 1999). The hypothesized factor structures of the constructs were found to have a generally good fit with the data.

To address RQ1, we conducted structural equation modeling using a two-step approach (Hair et al., 2010). The first step involved testing the measurement model, and the second step focused on testing the theoretical linkages among the variables. The first step allowed the evaluation of convergent and discriminant validity, while the second step was used in assessing nomological validity. In testing the measurement model, we conducted a CFA with teacher support, teacher–student relatedness, and academic engagement modeled as latent constructs. Next, we tested the structural model. The structural model posits teacher autonomy support, teacher competence support, and teacher–student relatedness as predictors of each of the academic engagement subscales.

To answer RQ2, we conducted multigroup CFA. We carried out nested model comparisons in order to examine *configural equivalence* and *measurement equivalence* across academic risk groups. Step 1 focused on assessing configural equivalence: It was done by comparing the baseline models, which estimate measurement and latent construct parameters, for both groups (see Byrne, 2008). Step 2 involved the assessment of *measurement equivalence*, which required holding the factor structure and factor loadings equal across groups (see Byrne, 2008). Step 3 required constraining the factor structure, factor loadings, variances, and covariances to be the same across groups (see Byrne, 2008; Cheung & Rensvold, 2002). The difference in CFI was calculated in comparing the baseline model (with no invariance imposed) with the constrained models. A decrease in CFI of less than .01 was considered nonsignificant (Cheung & Rensvold, 2002)

To further address RQ2, we used the best-fitting structural model and repeated Steps 1 and 2 that were mentioned earlier. However, we modified Step 3 by holding the factor structure, loadings, and causal paths the same across risk groups (see Byrne, 2008; Cheung & Rensvold, 2002). The last step involved adding equal variance and covariances to the constraints introduced in Step 3. The difference in CFI for the baseline model (with no invariance imposed) and the constrained model was also compared.

In order to answer RQ3, we conducted a series of multivariate analysis of variance (MANOVA) to examine if risk group (low risk vs. high risk) has a significant effect on the three sets of dependent variables—teacher support, teacher–student relatedness, and academic engagement. We decided to exclude the moderate-risk

groups and compared only the variables associated with the low- and high-risk groups as we expected that these groups would have a more pronounced contrast in their profiles. We deemed that limiting our analyses to these groups would facilitate the interpretation of results.

Results

Goodness of Fit of the Measurement and Structural Models

The results of our initial analyses showed that all the central variables involved in the study, except ALIEN, were positively related to all the dimensions of academic engagement. ALIEN was found to be negatively correlated with all the engagement dimensions. The intercorrelations among the engagement subscales, between TRUST and COMM and between TCS and TAS, were moderate to high.

The hypothesized factor structures of teacher–student relatedness, perceived teacher support, and academic engagement were found to have a good fit to the data (see Table 32.1, Model 1). We also evaluated the fit of Model 2 that resembled Model 1 except that the errors of the engagement variables for the former were correlated. This was done noting the high intercorrelations among the engagement subscales (see Table 32.2), which was also reported in earlier studies (Skinner et al., 2008). The high modification indices associated with the correlation of the errors associated with the engagement subscales further justified the need to test Model 2. Compared to Model 1, Model 2 was found to have a better fit to the data. Thus, we adopted Model 2 as our final model for this study.

Our results provided partial support for *H1*. TAS and TCS were found as significant positive predictors of the students' academic engagement subscales; however, TRUST but not COMM emerged as a significant positive predictor of academic engagement (see Table 32.3). Our analysis also indicated that ALIEN served as a negative predictor of CENG but not of BENG and EENG: These findings generally

Table 32.1 Goodness of fit indices for the measurement model and structural model

Model	χ^2	d*f*	χ^2/d*f*	*p*	RMSEA	90 % CI RMSEA	SRMR	CFI
Measurement model	3206.03	637	5.033	<.001	.052	[.051, .054]	.0357	.947
Structural model 1	4691.28	639	7.342	<.001	.066	[.064, .067]	.0730	.917
Structural model 2[a]	3074.12	636	4.834	<.001	.051	[.049, .053]	.0358	.950

Note: *RMSEA* root mean square error of approximation, *SRMR* standardized root mean square residual, *CFI* comparative fit index

[a]Errors of the engagement subscales were correlated

Table 32.2 Intercorrelations among teacher support, teacher–student relatedness, and engagement subscales ($N = 1469$)

Subscales	TAS	TCS	COMM	TRUST	ALIEN	BENG	EENG	CENG
TAS		.83**	.48**	.62**	−.22**	.62**	.70**	.64**
TCS			.40**	.59**	−.25**	.59**	.67**	.60**
COMM				.57**	.11**	.40**	.45**	.42**
TRUST					−.14**	.51**	.57**	.50**
ALIEN						−.15**	−.19**	−.10**
BENG							.82**	.78**
EENG								.81**
Cronbach's alpha (α)	.96	.96	.88	.88	.80	.90	.91	.92
90%CI α	[.96, .97]	[.95, .96]	[.87, .89]	[.87, .89]	[.79, .82]	[.90, .91]	[.90, .92]	[.91, .93]

Note: *TAS* teacher autonomy support, *TCS* teacher competence support, *COMM* communication with the teacher, *TRUST* trust in the teacher, *ALIEN* alienation from the teacher, *BENG* behavioral engagement, *EENG* emotional engagement, and *CENG* cognitive engagement, **p < .01

Table 32.3 Structural parameter estimates for the model relating teacher support and teacher–student relatedness with academic engagement

Structural relationship	Unstandardized parameter estimates	Standard error	*t*-value	Standardized parameter estimates
TAS → CENG	0.27	0.03	9.21***	0.46
TAS → BENG	0.21	0.03	6.85***	0.35
TAS → EENG	0.21	0.03	8.58***	0.40
TCS → CENG	0.09	0.03	3.52***	0.16
TCS → BENG	0.09	0.03	3.58***	0.17
TCS → EENG	0.11	0.02	5.18***	0.22
COMM → CENG	0.04	0.03	1.04	0.03
COMM → BENG	0.01	0.04	0.40	0.01
COMM → EENG	0.05	0.03	1.81	0.06
TRUST → CENG	0.14	0.04	3.56***	0.13
TRUST → BENG	0.21	0.04	5.27***	0.20
TRUST → EENG	0.17	0.03	5.37***	0.19
ALIEN → CENG	0.08	0.03	2.46*	0.07
ALIEN → BENG	−0.04	0.03	−1.10	−0.03
ALIEN → EENG	−0.04	0.03	−1.37	−0.04

Note: *TAS* teacher autonomy support, *TCS* teacher competence support, *COMM* communication with the teacher, *TRUST* trust in the teacher, *ALIEN* alienation from the teacher, *BENG* behavioral engagement, *EENG* emotional engagement, and *CENG* cognitive engagement
*$p < .05$, ***$p < .001$

contrasted with *H2*. TAS emerged as the strongest positive predictor of all engagement subscales. It was also found that TRUST and TCS had comparable influences on students' engagement.

Table 32.4 Invariance test of the measurement model across low-risk and high-risk students

Measurement model	χ^2	df	χ^2/df	RMSEA	RMSEA 90 % CI	SRMR	TLI	CFI	Change in CFI
Baseline model (no invariance imposed)	2952.05	1274	2.32	.041	[.039, .043]	.044	.928	.934	–
Invariant factor loadings	2992.70	1304	2.30	.040	[.039, .042]	.046	.929	.934	.000
Invariant factor variances and covariances	3192.34	1340	2.38	.042	[.040, .044]	.073	.924	.928	.006

Note: *RMSEA* root mean square error of approximation, *SRMR* standardized root mean square residual, *CFI* comparative fit index

Invariance of the Measurement and Structural Models Across Risk Groups

Both the measurement and structural models (i.e., Model 2) were tested for invariance across risk groups. We imposed increasing constraints on the multigroup CFA and SEM analyses (see Tables 32.4 and 32.5). Using Cheung and Rensvold's (2002) criterion (i.e., CFI change less than .01 as evidence of invariance), our results indicated that both the measurement and SEM models were invariant for the low- and high-risk groups thereby supporting *H2*.

Descriptive Statistics, Correlations, and MANOVA Results

To answer the third research question, we conducted MANOVAs using teacher competence and autonomy support, teacher–student relatedness subscales, and engagement subscales as dependent variables and risk group as between-subjects factor. The results generally showed that there were significant differences between high-risk and low-risk groups in relation to the overall and separate subscale scores, although the effect sizes were small.

Our results partially supported *H3a*. The effects of risk group were found significant on overall engagement (Pillai's trace = 0.94, $F(3,791) = 4.38$, $p < .01$, $\eta^2 = .02$), perceived teacher support (Pillai's trace = 0.94, $F(2,792) = 9.42$, $p < .001$, $\eta^2 = .02$), and teacher–student relatedness (Pillai's trace = 0.96, $F(3,791) = 33.65$, $p < .001$, $\eta^2 = .11$). Compared to the high-risk group, the low-risk group reported higher engagement scores (BENG, $F(1,793) = 12.08$, $p < .01$, $\eta^2 = .015$; EENG, $F(1,793) = 5.05$, $p = .025$, $\eta^2 = .006$; CEENG, $F(1,793) = 4.17$, $p = .042$), higher quality of perceived competence support ($F(1,793) = 24.61$, $p < .01$, $\eta^2 = .02$), and higher levels of trust ($F(1,793) = 11.42$, $p < .001$, $\eta^2 = .01$).

Table 32.5 Invariance test of the SEM model across low-risk and high-risk students

Structural model	χ^2	d*f*	χ^2/df	RMSEA	RMSEA 90 % CI	SRMR	TLI	CFI	Change in CFI
Baseline model (no invariance imposed)	2830.31	1272	2.23	.039	[.037, .041]	.047	.932	.939	–
Invariant factor loadings	2873.68	1302	2.21	.039	[.037, .041]	.047	.933	.939	.000
Invariant structural weights	2907.82	1317	2.21	.039	[.037, .041]	.051	.934	.938	.001
Invariant factor variances and covariances	3066.43	1332	2.30	.041	[.039, .042]	.066	.928	.932	.008

Note: *RMSEA* root mean square error of approximation, *SRMR* standardized root mean square residual, *CFI* comparative fit index

Two findings contradicted *H3a*. Firstly, the teacher autonomy support received by low-risk and high-risk students was found to be statistically comparable ($F(1,793) = 1.61$, $p = .21$, $\eta^2 = .002$). Secondly, the high-risk students generally reported lower levels of COMM than did the low-risk students ($F(1,793) = 13.19$, $p < .01$, $\eta^2 = .03$).

Consistent with *H3b*, ALIEN ($F(1,793) = 21.48$, $p < .001$, $\eta^2 = .06$) was found to be higher for the high-risk than the low-risk students. Students in the high-risk group tended to feel more emotionally detached from their teachers than their low-risk peers (Table 32.6).

General Discussion

In this study, we focused on three indicators of a supportive context provided by teachers—autonomy support, competence support, and teacher–student relatedness—and their association with students' behavioral, cognitive and emotional engagement. In consonance with SDT, our analysis showed that teachers' autonomy and competence support and teachers' trust in students served as positive significant predictors of the full range of students' academic engagement. This association among our central constructs, along with the factor structure of the constructs, was found to be invariant across low-risk and high-risk students.

Compared to teacher–student relatedness and teacher competence support, teacher autonomy support was found to exert the strongest influence on all engagement dimensions. This finding is contrary to our prediction that competence support would be the most salient predictor of engagement compared to the other

Table 32.6 Descriptive statistics for low-risk group, high-risk group, and overall

Subscales	All ($N=1469$)		Low risk ($n=399$)		High risk ($n=396$)	
	Mean	SD	Mean	SD	Mean	SD
TAS	5.15	1.43	5.22	1.42	5.10	1.41
TCS	5.32	1.44	5.49**	1.37	5.14**	1.49
COMM	1.95	0.82	1.85**	0.77	2.11**	0.84
TRUST	2.70	0.84	2.84***	0.83	2.64***	0.83
ALIEN	1.91	0.67	1.77***	0.57	2.09***	0.78
BENG	2.86	0.76	2.97**	0.72	2.79**	0.76
EENG	2.84	0.81	2.91*	0.79	2.78*	0.80
CENG	2.73	0.81	2.80*	0.77	2.69*	0.81

Note: *TAS* teacher autonomy support, *TCS* teacher competence support, *COMM* communication with the teacher, *TRUST* trust in the teacher, *ALIEN* alienation from the teacher, *BENG* behavioral engagement, *EENG* emotional engagement, and *CENG* cognitive engagement
Significance of univariate tests, *$p<.05$, **$p<.01$, ***$p<.001$

predictor variables. This seems to contradict the position taken by cross-cultural researchers who question the role of autonomy support among Asian students (e.g., Markus & Kitayama, 2003). This empirical result is coherent with the assertions of other researchers (e.g., D' Ailly, 2003; Jang, Reeve, Ryan, & Kim 2009) that the satisfaction of the need for autonomy is also relevant to Asian students. This result also resonates with the conclusions drawn from Jang et al.'s study (2010), which also featured secondary students from the West: They found that teacher autonomy support predicted the three key dimensions of students' academic engagement, while competence support was found more narrowly associated with behavioral engagement. Thus, it appears that the critical role of teacher autonomy support in promoting students' academic engagement cuts across boundaries between Asian and Western cultures. This lends support to studies of cross-cultural educational researchers who have found broad similarities among the psychological factors that promote greater levels of achievement in Asian and Western contexts (Fok & Watkins, 2007; Watkins, 2010; Watkins, McInerney, Lee, Akande, & Regmi, 2002).

Furthermore, teachers' provision of autonomy support appears to be a potentially strong protective factor for academically at-risk students, noting that autonomy support served as a significant determinant of the academic engagement of both low-risk and high-risk students. However, there was no significant difference in the quality of autonomy support provided by the teachers as perceived by the low-risk and high-risk students. Given the fact that our sample involved students who were relatively lower performing compared to their peers in the mainstream track, it is possible that both the low- and high-risk groups in our sample had substantial proportions of students with low self-regulation abilities, as asserted by VanZile-Tamsen and Livingston (1999), and, not surprisingly, indicated similar degrees of potential academic benefits from autonomously supportive teachers.

Competence support was also found crucial in promoting the academic engagement of the present sample, which is consistent with the assertion of some research-

ers (e.g., Kao, 2004; Schneider & Lee, 1990) that Asian students tend to respond positively to adult's competence-supportive behavior that has some elements of behavioral control. The results of our study also showed that teacher competence support may operate in a broader range of engagement dimensions for Asian adolescents than for Western students (i.e., those featured in the study of Jang et al., 2010). This is perhaps due in part to the teachers' enhanced drive to provide strong competence support to students owing to the generally high currency placed on academic performance in the examination-driven educational curriculum of Singapore.

When compared with the influence of teacher autonomy and competence support, the effects of teacher–student relatedness on academic engagement were also positive but relatively weaker. The three dimensions of teacher–student relatedness did not have a consistent association with academic engagement: Only teachers' trust in students served as a consistent predictor of all the dimensions of academic engagement. These findings partly affirmed the results reported by Jang et al. (2010) who also highlighted a relatively weaker influence of relatedness compared to autonomy and competence support on the academic engagement of Western students. Our findings are also coherent with the view that the teachers' realm of influence in relation to students' academic functioning would be more on providing support for the development of autonomy and competence and less on providing relatedness support (see Legault et al., 2006).

Going further, our results show that the high-risk students reported lower levels of competence support, perceived trust from teachers, and class engagement compared to their low-risk counterparts. These findings concur with the observations of researchers (Hughes & Kwok, 2007; Skinner & Belmont, 1993) that teacher behavior is reciprocally linked with students' behavior and performance. The present sample of academically at-risk students might have been exposed to cumulative negative experiences due to their placement into the lower academic ability bands: They are often perceived as the "more problematic" students relative to their peers (Tan, 2008). These students tend to suffer from lower levels of competence support and less involvement from their teachers (Chen & Astor, 2011; Skinner & Belmont, 1993). Given that these students could have been exposed to substantial levels of negative experiences with their teachers (and, perhaps, with other significant others), these students are likely to feel that their teachers do not believe in their capabilities. Our results underline the need for more conscious efforts from the teachers in providing competence support (e.g., constructive feedback, clear instructions and expectations, and ability-suited learning tasks and teaching strategies) and raising levels of trust to assist in buffering students' risk of following low-engagement and low-achievement trajectories. Academically at-risk students, especially high-risk ones, may need more explicit assurance from their teachers that they would not be judged negatively when they engage in class activities.

It is worth noting that the high-risk students in the present study indicated higher quality of communication and feelings of alienation with their teachers. It is also puzzling that greater openness in communicating with teachers did not seem to matter considerably in predicting the class engagement of our academically at-risk sample, although the literature suggests that at-risk students may gain more benefits

than their mainstream peers when exposed to positive teacher–student interactions (Hamre & Pianta, 2006, 2012). When teachers interact with students who experience difficulties in coping academically, the students' openness in communicating their ideas to their teachers appears to be an insufficient proxy of a healthy teacher–student relationship. As our results suggest, high-risk students may report high levels of communication with their teachers, but still experience high levels of alienation and perceive low levels of trust from their teachers, both of which are counterproductive to raising academic outcomes of at-risk students. Low perceptions of trust, acceptance, and confidence from their teachers might have diluted the supposed positive effects of high-quality communication, which, in turn, could have predisposed students toward greater feelings of alienation from their teachers. Our findings can be better understood by noting that the effect of communication is always mediated by the effectiveness of the communicator and the context in which the communication takes place (Kraft & Dougherty, 2012). To further shed light on the foregoing issues, future research efforts may focus on identifying the mechanism of how teacher–student communication—including its frequency, context, and nature—influences students' engagement.

Conclusion and Implications

At least in relation to the English subject domain, the results of this study point toward the relevance of SDT and related constructs in predicting variability in students' engagement for academically at-risk Asian students, particularly those attending Singapore schools. When taken as a whole, our findings have implications that speak about the nature of the influence of teacher behavior on explaining students' classroom engagement.

This study underscored the importance of teachers' roles in fostering students' autonomy and competence and establishing trust in promoting adaptive behaviors in class, such as high academic engagement. Students' engagement appears to flourish when teachers provide high autonomy (low coercion) and high competence (high certainty and feedback) support within an atmosphere of trust. Teachers seeking engagement-fostering instructional strategies need to focus on these factors that can buffer the negative effects of academic stressors on academically at-risk students. As trust issues may be the most difficult to establish among the three factors mentioned, teachers are reminded to be mindful of any latent bias they might unwittingly hold toward students at high risk of academic failure. Specifically, when interacting with students who are struggling academically, teachers need to be more cognizant of the extent to which they project trust or distrust in their students' behavioral and academic abilities.

When appropriate actions are carried out to improve the quality of teachers' supportive roles in the academic life of students, a chain of positive effects may be expected. This conjecture is based on research reports suggesting the reciprocal link between teacher behavior and engagement (Hughes & Kwok, 2007; Skinner &

Belmont, 1993), that is, better engaged students tend to elicit greater involvement and support from their teachers and vice versa. Nevertheless, the importance of constantly finding ways at improving the capability of teachers to provide support for the students, especially those facing academic risk, should not be overstated. The insightful work by Reeve and colleagues (2004) is instructive on how to translate knowledge about these supportive approaches into practice. It could be potentially beneficial for students, especially for low-achieving students, if schools could implement intervention programs aimed at improving teachers' capacity—both in terms of whats and hows—to afford the varied forms of support to their students.

Future studies may extend our investigation toward the examination of the impact of teacher support on at-risk students' academic achievement and other affective outcomes such as school belonging, school resilience, and self-concept. As the use of students' self-reports is considered as the main limitation of this study, we encourage future research efforts to utilize other data sources. Studies of this kind would provide a more comprehensive perpective in looking at the crucial role of teachers in cultivating adaptive outcomes to help at-risk students deviate from the trajectory of continued low achievement.

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