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Factors related to Taiwanese adolescents' academic engagement and achievement goal orientations

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ABSTRACT

The present study examined the relationships of Taiwanese eighth graders' perceived autonomy support from teachers, parental psychological control, implicit theories of intelligence, and achievement goal orientations to their agentic, behavioral, emotional, and cognitive engagement in schoolwork. Also, the current research explored the determining factors of Taiwanese adolescents' achievement goal orientations. Four hundred and two eighth-grade Taiwanese students completed a self-reported survey assessing the variables described above. Results of hierarchical regression analyses indicated that autonomy support from teachers along with incremental theory of intelligence positively predicted all the four components of academic engagement. Each aspect of academic engagement was associated with different achievement goal orientations. Additionally, results of this study suggested that teachers' autonomy support versus parental psychological control as well as students' incremental versus entity theories of intelligence all positively predicted mastery-avoidance, performance-approach, and performance-avoidance goal orientations. Implications for educational practices and future research are discussed.

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Academic engagement; achievement goal orientations; autonomy support; psychological control; implicit theories of intelligence

In Asian societies, the pressures to perform well in schoolwork are intense due to the familial and cultural demands for academic excellence (Huan, Yeo, Ang, & Chong, 2006). Academic achievement is viewed in Asian societies as the primary ways for upward mobility and expanded opportunities for career development. Academic engagement is hence valued in countries such as China, Japan, Korea, Singapore, and Taiwan (Ang & Huan, 2006; Tan & Yates, 2011). For example, a vast majority of Taiwanese adolescents attend cram schools intended to supplement their regular education in order for the pursuit of academic success (Shih, 2016). Despite the great emphasis on academic engagement in the Taiwanese classroom context, little research has examined the antecedents that can reliably predict each aspect of Taiwanese adolescents' academic engagement. To address this paucity in the research, the present study was conducted to shed light on the factors that may determine adolescent students' academic engagement within the Asian cultural context.

Academic engagement

Over the past two decades, research on academic engagement has received great attention in the field of education because engagement has been found to be both a malleable state that can be shaped in the classroom environment and a significant predictor of students' academic progress and achievement (Appleton, Christenson, & Furlong, 2008; Furlong, & Christenson, 2008; Reeve, 2012; Reeve & Tseng, 2011; Skinner & Pitzer, 2012). Such attention echoes an emerging trend toward a positive psychology. Instead of focusing on weaknesses and malfunctioning, this line of research pays more attention to the study of human strengths and optimal functioning (Maslach, Schaufeli, & Leiter, 2001). Engagement refers to energized, directed, and sustained action of students' actual interactions with academic tasks (Skinner & Pitzer, 2012). Academic engagement is a multidimensional construct comprised of not only behavioral, but also emotional and cognitive components. The behavioral aspect of engagement is characterized as effort, on-task attention, persistence, intensity, and perseverance in the face of difficulties. The emotional aspect of engagement includes elements like enthusiasm, enjoyment, fun, satisfaction, as well as absence of anxiety and boredom. The cognitive component contains the use of strategic and sophisticated learning strategies along with active self-regulation (Reeve & Tseng, 2011; Skinner & Pitzer, 2012).

It has been suggested that while the existing concept of behavioral, emotional, and cognitive engagement nicely captures the extent to which students react to teacher-provided learning activities, this three-component model of academic engagement paints an incomplete picture. The three-component model falls short of capturing the degree to which students contribute agentically into the on-going flow of the instruction they receive, in other words, agentic engagement (Reeve, 2012; Reeve & Tseng, 2011). Agentic engagement is

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described as a process in which students intentionally and proactively try to personalize and enrich both what is to be learned and the conditions and circumstances under which it is to be learned. Reeve and his colleagues (Reeve, 2012; Reeve & Tseng, 2011) proposed that in addition to the three components mentioned above, academic engagement also includes initiating a process in which students generate options that expand their freedom of actions and increase the chance of experiencing both strong motivation and meaningful learning. For instance, students in class express their preferences and opinions and let the teacher know what they are interested in. To thoroughly examine Taiwanese adolescents' academic engagement, the four-component model of engagement (i.e., behavioral, emotional, cognitive, and agentic engagement) was employed in the present study.

Achievement goals

Students vary considerably in their engagement in schoolwork. Given that engagement has been viewed as the outward manifestation of motivation (Skinner & Pitzer, 2012), the motivation behind academic engagement is crucial in understanding and predicting the very construct. One of the prominent approaches that has been adopted in the detection of individuals' motivation closely linked to engagement is achievement goal theory. Over the past several decades, achievement goal theory has emerged as a dominant theoretical perspective on students' motivation in school (Anderman & Wolters, 2006; Elliot, 2005). Achievement goals refer to the purposes or reasons for a person's pursuit in an achievement situation. Different purposes result in different patterns of cognition, affect, and behavior (Anderman & Patrick, 2012). To date, a full 2×2 crossing of the mastery-performance and approach-avoidance distinctions has been proposed by achievement goal theorists to account for the broad spectrum of competence-based strivings (Elliot & McGregor, 2001). Competence may be defined according to whether one has fully mastered the task at hand or performed better than others (i.e., the mastery-performance distinction). Additionally, an achievement goal may focus the individual on attaining a positive, desirable possibility (an approach goal) or avoiding a negative, undesirable possibility (an avoidance goal).

The 2×2 model has been supported in both North American (Conroy, Elliot, & Hofer, 2003) and Asian samples (Bong, 2009). Mastery-approach goals motivate individuals to increase their competence or achieve task mastery. Mastery-avoidance goals represent strivings to avoid losing one's skills and abilities or a lack of task mastery. Performance-approach goals focus students on demonstrating their ability relative to others or proving their self-worth. Finally, performance-avoidance goals lead students to avoid appearing incompetent or less able than others. Each goal type has been linked to a distinctive predictive profile of learning and therefore may help to explain the different quality of engagement in schoolwork. In terms of behavioral engagement, mastery goals are found to be associated with such positive academic behaviors as effort expenditure (Miller, Greene, Montalvo, Ravindran, & Nichols, 1996), engaging in relevant activities outside of school (Anderman & Johnston, 1998), and seeking help when needed (Ryan & Pintrich, 1997). By contrast, a focus on performance goal orientation is related to avoidance of seeking help (Ryan & Pintrich, 1997) and being disruptive during lessons (Ryan & Patrick, 2001).

With regard to emotional engagement, mastery goals appear to be negatively related to math anxiety (Skaalvik, 1997). Moreover, this type of goal is positively related to positive affect about school (Roeser, Midgley, & Urdan, 1996) and feelings of hopefulness (Daniels et al., 2009). Performance-approach goals are also positively associated with feelings of hopefulness (Daniels et al., 2009) and are weakly and negatively related to math anxiety (Skaalvik, 1997). By contrast, performance-avoidance goals are positively related to both math and verbal anxiety (Skaalvik, 1997). As for cognitive engagement, results of a study with a large sample of South Korean adolescents (Bong, 2009) indicated that both mastery-approach and mastery-avoidance goals are positively correlated with the use of cognitive strategies (e.g., rehearsal, elaboration, and organization strategies) and more adaptive self-regulation (e.g., monitoring their comprehension), the associations with mastery-avoidance goals are weaker, though. In the same study, Bong (2009) found that performance-approach goals are positively related to greater use of cognitive as well as self-regulatory strategies. Nolen (1988), nevertheless, in an earlier study, found that performance goals are either unrelated or negatively related to students' use of deep-processing strategies and either unrelated or positively related to the use of surface-level strategies. Approach and avoidance orientations were not yet differentiated when Nolen's study was conducted. There has been no study exploring the effects of achievement goals on the newly proposed agentic engagement. The present study was hence intended to examine the relationships of Taiwanese adolescent' achievement goals to the four aspects of academic engagement. In doing so, the effects of achievement goals on academic engagement may be completely identified.

It has been suggested that achievement goals can be activated by some abstract reasons stemming from intrapsychic (e.g., individuals' implicit theories of intelligence) or environmental processes (e.g., autonomy support and psychological control in the family or classroom contexts). In turn, individuals adopt more concrete goals to accomplish the underlying concern, need, or motive related to the above processes (Elliot & Thrash, 2001). To obtain a comprehensive understanding of the influences of these processes on students' achievement goal orientations and academic engagement, in the current study, the effects of implicit theories of intelligence along with teachers' autonomy support and parental psychological control were examined.

Implicit theories of intelligence

As a cognitive framework that guides how individuals interpret and react to achievement situations, implicit theories of intelligence refer to one's deeply held, but rarely articulated thoughts about the nature of intelligence (Dweck, 2000;

Hong, Chiu, & Dweck, 1995). Entity theorists believe that intelligence is a fixed entity that cannot be developed over time, whereas incremental theorists believe that intelligence is malleable and can be increased. Negative performance outcomes are likely to be interpreted by entity theorists as indicators of intellectual inadequacy. In contrast, incremental theorists are oriented toward developing their intellectual ability rather than diagnosing it. Accordingly, incremental theorists are less likely than entity theorists to make negative ability inferences following failure. Unsatisfactory performance may signify that their abilities would be improved through further attention and effort. When the ability is perceived as fixed, poor performance easily gives rise to serious anxieties because of the implied negative evaluation of the self. These concerns may lead entity theorists to adopt avoidance-based goals for concealing incompetence. Conversely, incremental theorists' orientations toward developing their intelligence may motivate them to espouse mastery-approach goals. After all, it is not sensible to sacrifice ability development to avoid a demonstration of inability (Dweck & Molden, 2005).

With respect to the relationships of implicit theories to engagement in schoolwork, individuals with different views about intelligence tend to use contrasting self-regulatory strategies to deal with the challenges and struggles they face in the academic context (Dweck & Molden, 2005; Molden & Dweck, 2006). The greater propensity to make negative ability inferences following failure may lead entity theorists to adopt such avoidance strategies as self-handicapping to conceal incapability (Rhodewalt, 1994). Put differently, entity theorists are likely to withdraw their engagement when encountering academic difficulties. On the contrary, when intelligence can be increased, performance setbacks are supposed to inspire incremental theorists to engage in self-regulation characterized by active, direct, and constructive coping to bring about improvement (Dweck & Molden, 2005). The present research thus attempted to investigate whether the incremental view of intelligence would positively predict students' behavioral, emotional, cognitive, and agentic engagement in academic tasks.

Autonomy support and psychological control

Another purpose of the current study was to examine the influences of teachers' autonomy support and parental psychological control on Taiwanese adolescents' achievement goal orientations and academic engagement. Self-determination (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000) is a widely studied theory of human motivation that provides a framework for understanding human tendencies toward active engagement and development. SDT has posited that individuals' motivated behaviors vary in the extent to which they are autonomous versus controlled. Behaviors regulated by autonomous motivation involve the experience of volition and choice, whereas controlled behaviors are experienced as being pressured or coerced (Black & Deci, 2000; Williams & Deci, 1996). According to SDT, autonomy is a psychological need critical for optimal learning and achievement. And autonomy-supportive environments are conducive to autonomy need satisfaction. In autonomy-supportive contexts, an individual in a position of authority takes the other's perspective, allows opportunities for self-initiation and choice, provides a meaningful rationale for the requirement, and acknowledges the other's feelings while minimizing the use of pressures and demands (Deci, Eghrari, Patrick, & Leone, 1994). In contrast, psychological control refers to control attempts that intrude into the psychological and emotional development of the person through use of manipulative techniques like guilt induction and love withdrawal (Soenens, et al., 2005).

Previous findings have shown that an autonomy-supportive teaching style is positively related to more school engagement (Assor, Kaplan, & Roth, 2002), better conceptual learning (Grolnick & Ryan, 1987), and higher academic competence and achievement (Soenens & Vansteenkiste, 2005). When interpersonal contexts are psychologically controlling, individuals' self-esteem hinges on performance. This type of ego involvement focuses people on proving and defending themselves rather than pursuing growth and challenge (Deci & Ryan, 1987). Put another way, social contexts characterized by autonomous support versus psychological control are expected to orient students toward different types of achievement goals and academic engagement.

Despite the consistently reported positive relationships between autonomy support and a variety of adaptive outcomes in the Western literature, several cross-cultural researchers (Chirkov & Ryan, 2001; Iyengar & DeVoe, 2003; Markus & Kitayama, 2003) have argued that the experience of autonomy is less encouraged by parents in Eastern societies. For instance, within the Chinese cultural context, high emphasis is placed on conformity and family interdependence because of prevailing Confucian values. Studies of the Taiwanese society indicated that instead of exercising personal choice, Taiwanese people tend to act primarily in accordance with anticipated expectations of others and social norms (Yang, 1997). Additionally, compared to American parents, Taiwanese parents are more likely to expect their children to excel academically (Benjamin, 2006). The child's motive to achieve may in fact reflect his or her parents' wishes. To determine whether effects of parental psychological control on Taiwanese adolescents' academic engagement would be as detrimental as SDT proponents suggest, this variable was thus also included in the present study.

The present study

In summary, the present study attempted to obtain a comprehensive understanding of the mechanisms determining Taiwanese adolescents' different aspects of academic engagement and different types of achievement goal orientations. There were two aims of this study. First, on the basis of the four-component model of engagement (i.e., behavioral, emotional, cognitive, and agentic engagement) proposed by Reeve and his colleagues (Reeve, 2012; Reeve & Tseng, 2011), this study was devised to identify whether teachers' autonomy support, parental psychological control, students'

Table 1. Summary of the information on the instruments used in the present study.

Variable of interest	Instrument used to measure the variable	Previous measures of instrument quality
Academic engagement	The Questionnaire of Engagement consisting of four subscales: Agentic engagement (5 items, $\alpha = .82$); Behavioral engagement (5 items, $\alpha = .91$); Emotional engagement (4 items, $\alpha = .84$); Cognitive engagement (8 items, $\alpha = .87$)	Reeve and Tseng (2011), The Questionnaire of Engagement: Agentic engagement ($\alpha = .82$); Behavioral engagement ($\alpha = .94$); Emotional engagement ($\alpha = .78$); Cognitive engagement ($\alpha = .88$)
Achievement goal orientation	The Achievement Goal Questionnaire consisting of four subscales: Mastery-approach goals (6 items, $\alpha = .86$); Mastery-avoidance goals (6 items, $\alpha = .88$); Performance-approach goals (6 items, $\alpha = .84$); Performance-avoidance goals (6 items, $\alpha = .76$)	Elliot and McGregor (2001), The Achievement Goal Questionnaire: Mastery-approach goals ($\alpha = .87$); Mastery-avoidance goals ($\alpha = .84$); Performance-approach goals ($\alpha = .96$); Performance-avoidance goals ($\alpha = .82$)
Teachers' autonomy support	The short version of the Learning Climate Questionnaire (6 items, $\alpha = .86$)	Yu, Traynor, and Levesque-Bristol (2018), The short version of the Learning Climate Questionnaire ($\alpha = .95$)
Parental psychological control	The Parental Psychological Control Scale (10 items, $\alpha = .93$)	Shek (2006), The Parental Psychological Control Scale ($\alpha = .90$)
Implicit theories of intelligence	The Theories of Intelligence Scale consisting of two subscales: Entity theory (4 items, $\alpha = .88$); Incremental theory (4 items, $\alpha = .79$)	King (2012), The Theories of Intelligence Scale: Entity theory ($\alpha = .87$); Incremental theory ($\alpha = .82$)

implicit theories of intelligence, and achievement goal orientations significantly predicted each aspect of Taiwanese adolescents' academic engagement.

Second, the current research was intended to investigate the extent to which teachers' autonomy support, parental psychological control, and students' implicit theories of intelligence functioned as significant predictors of the four types of achievement goal orientations (i.e., mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals). To these ends, hierarchical regression analyses were carried out in the current study.

Method

Participants

The participants included 402 eighth-grade Taiwanese students from twenty classes in four junior high schools. Participating schools were located in the northern part of Taiwan. All of school principals granted initial consent for data to be collected in their schools. The 211 boys (53%) and 191 girls ranged in age from 14 years to 15 years, 9 months ($M = 14$ years, 8 months, $SD = 4$ months). The school districts were primarily middle class in terms of socioeconomic status. All of the participants were Taiwanese. Students' participation was voluntary. Guidelines for the proper treatment of human subjects were followed (APA, 2010). All participants had parental consent to take part in the study. Confidential treatment of the data was guaranteed.

Procedure

The data were collected at the beginning of the eighth grade. Students were invited to fill out a survey (described in detail below) during regular class time. It took participants about 20 minutes to complete the questionnaire. There were two research assistants in each class for the data collection. They assured students of the confidentiality of their self-reports and encouraged them to respond to all items as accurately as possible.

Measures

Participants were instructed to respond to all items using a five-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree). A Chinese language version of this self-report survey was used. All measures utilized in the present study were translated into Chinese and then back-translated into English. To ensure adequate translation, guidelines of the International Test Commission (Hambleton, 1994) were followed. Participants' familiarity with item format, item content, and test procedures was ensured by checking with two Taiwanese junior high students during the translation process. Also, statistical techniques were selected to establish the equivalence of the different language versions of the measure. Information on each instrument used in the present study is detailed below. Table 1 summarizes the information about the instruments employed in the present research along with previous measures of instrument quality.

Academic engagement. Students' academic engagement was assessed by the Questionnaire of Engagement (Reeve & Tseng, 2011). This questionnaire consists of four subscales measuring four aspects of student engagement in the classroom context: agentic engagement (e.g., "I let my teacher know what I am interested in" and "During class, I express my preferences and opinions"; 5 items; $\alpha = .82$); behavioral engagement (e.g., "I pay attention in class" and "I work hard when we start something new in class"; 5 items; $\alpha = .91$); emotional engagement (e.g., "I enjoy learning new things in class" and "When I am in class, I feel curious about what we are learning; 4 items; $\alpha = .84$), and cognitive engagement (e.g., "When doing schoolwork. I try to relate what I am learning to what I already know" and "I make up my own examples to help me understand the important concepts I study"; 8 items; $\alpha = .87$). Higher scores represent higher levels of student engagement in the academic context.

Achievement goal orientations. The questionnaire assessing adolescents' achievement goal orientations was developed based on the work of Elliot and McGregor (2001). This questionnaire is composed of four scales for each type of achievement goals. Four scores representing mastery-approach (e.g., "I want to learn as much as possible from this class" and "My aim is to completely master the material presented in this class"; 6 items; $\alpha = .86$), mastery-avoidance (e.g., "It is important for me to avoid losing what I have learned from this class" and "My goal is to avoid learning less than it is possible to learn"; 6 items; $\alpha = .88$), performance-approach (e.g., "It is important for me to do well compared to others in this class" and "My goal is to perform

better than the other students"; 6 items; $\alpha = .84$), and performance-avoidance goals (e.g., "I just want to avoid doing poorly in this class compared with others" and "I am striving to avoid performing worse than others; 6 items; $\alpha = .76$) for each student were created accordingly.

Teachers' autonomy support. Students' perceptions of autonomy support provided by their teachers were assessed by the short version of the Learning Climate Questionnaire (LCQ; Williams & Deci, 1996). Six items measure the degree to which students perceive instructors as supporting student autonomy (e.g., "My instructor provides me with choices and options" and "My instructor listens to how I would like to do things"; $\alpha = .86$). Higher scores represent higher levels of perceived autonomy support in the classroom context.

Parental psychological control. Students' perceptions of parental psychological control were measured by the Parental Psychological Control Scale (Shek, 2006). Ten items assess parental psychological control in a global manner (e.g., "My parents want to control everything in my life" and "During our conversation, my parents always dominate the conversation and want me to follow their view"; $\alpha = .93$). Higher scores represent higher levels of perceived psychological control in the family context.

Implicit theories of intelligence. Students' implicit theories of intelligence were assessed by the Theories of Intelligence Scale (Dweck, 2000). The scale is composed of two four-item subscales of the entity (e.g., "Your intelligence is something about you that you can't change very much" and "To be honest, you can't really change how intelligent you are"; $\alpha = .88$) and incremental theories (e.g., "You can always substantially change how intelligent you are" and "You can change even your basic intelligence level considerably"; $\alpha = .79$). Higher scores represent higher levels of tendency to adopt the particular type of implicit theory of intelligence.

Data analysis

Given that the current study aimed to examine the determinants of Taiwanese adolescents' academic engagement and achievement goal orientations, the data were analyzed using hierarchical multiple regressions. To test the first assumption that teachers' autonomy support, parental psychological control, students' implicit theories of intelligence, and achievement goal orientations significantly predicted students' academic engagement, hierarchical regression analyses consisting of 3 successive steps were conducted. In this set of analyses, each aspect of academic engagement (i.e., agentic, behavioral, emotional, and cognitive engagement) functioned individually as the dependent variable. In the first regression model, teachers' autonomy support and parental psychological control were entered as the independent variables to test their contributions to students' academic engagement. Teachers' autonomy support and parental psychological control were given the higher priority of entry because these predictors were presumed to be causally prior to other predictors included in the regression models (Tabachnick & Fidell, 2007). In the second model, students' implicit theories of intelligence (i.e., entity and incremental theories) were added as the independent variables to test their contributions to academic engagement (while controlling for the variables entered in the first step). In the final model, the four types of achievement goal orientations (i.e., mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goal orientations) were included as the independent variables (while controlling for the variables entered in the first and second steps).

To examine the second assumption that teachers' autonomy support, parental psychological control, and students' implicit theories of intelligence reliably predicted students' achievement goal orientations, hierarchical regression analyses consisting of 2 successive steps were conducted. In this set of analyses, each type of achievement goal orientation (i.e., mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goal orientations) functioned individually as the dependent variable. In the first regression model, teachers' autonomy support and parental psychological control were entered as the independent variables to test their contributions to students' achievement goal orientations. In the second regression model, students' implicit theories of intelligence were added as the independent variables (while controlling for the variables entered in the first step). The alpha level used to determine the significance of all of these analyses was set at .01. This more conservative alpha level was selected to reduce the possibility of making a Type I error arising from completing a series of analyses with related outcomes (Tabachnick & Fidell, 2007).

Results

Regression analyses

Descriptive information and correlations for study variables are shown in Table 2. Results from regression analyses are presented first for outcomes regarding academic engagement and then for achievement goal orientations. Regression assumptions (i.e., normality, linearity, and homoscedasticity) were examined before performing the regression analyses. Results indicated that the assumptions needed for regression were met. Of the school and student characteristics, gender was the only variable that was tested as a potential covariate before running the regression. Such school characteristics as school locations and the socioeconomic status of the school districts were not controlled for because all the participating schools were located in the same geographical part of Taiwan and in the middle-class districts. In terms of student characteristics, participating students were all Taiwanese and eighth graders. None of the participants received special education services. Gender was hence the only characteristic variable that may need to be taken into account. In the preliminary analysis, gender was entered in regression models. It turned out that gender failed to predict any outcome variable of interest. Therefore, gender was not included as a predicting variable in the current research.

Table 2. Descriptive statistics and correlations for study variables (N = 402).

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Teachers' autonomy support	—											
2. Parental psychological control	−.07	—										
3. Incremental theory	.31**	.03	—									
4. Entity theory	−.06	.27**	−.25**	—								
5. Mastery-approach goals	.51**	.02	.40**	−.09	—							
6. Mastery-avoidance goals	.44**	.16**	.28**	.11	.59**	—						
7. Performance-approach goals	.35**	.17**	.30**	.09	.55**	.57**	—					
8. Performance-avoidance goals	.36**	.22**	.23**	.19**	.49**	.72**	.71**	—				
9. Agentic engagement	.45**	−.08	.28**	.01	.35**	.21**	.30**	.22**	—			
10. Behavioral engagement	.49**	−.02	.38**	−.13**	.69**	.50**	.40**	.45**	.37**	—		
11. Emotional engagement	.55**	−.08	.35**	−.16**	.66**	.40**	.31**	.32**	.48**	.75**	—	
12. Cognitive engagement	.56**	−.06	.34**	−.11*	.71**	.45**	.43**	.41**	.53**	.74**	.72**	—
M	3.60	3.01	3.25	3.37	3.66	3.44	3.33	3.32	3.04	3.68	3.56	3.48
SD	.74	1.09	.86	1.03	.80	.92	.86	.82	.86	.80	.81	.74

Note. *$p < .05$. **$p < .01$.

Table 3. Summary of hierarchical regression analyses predicting academic engagement (N = 402).

	Agentic engagement			Behavioral engagement			Emotional engagement			Cognitive engagement		
Variable	β	*t*	$\triangle R^2$	β	*t*	$\triangle R^2$	β	*t*	$\triangle R^2$	β	*t*	$\triangle R^2$
Step 1	.20		.24	.		.30						.31
Teachers' support	.44***	9.86		.49***	11.21		.54***	12.89		.55***	13.25	
Parental control	−.04	−.95		.01	.31		−.04	−.98		−.02	−.50	
Step 2		.	.03			.06			.03			.03
Teachers' support	.39***	8.33		.41***	9.26		.48***	11.12		.50***	11.50	
Parental control	−.08	−1.62		.01	.30		−.03	−.70		−.03	−.59	
Incremental theory	.18***	3.78		.24***	5.27		.19***	4.16		.18***	−.46	
Entity theory	.08	1.71		−.05	−1.12		−.07	−1.66		−.02	3.91	
Step 3			.03			.23			.17			.22
Teachers' support	.35***	6.66		.15***	3.46		.28***	6.46		.25***	6.18	
Parental control	−.08	−1.66		−.02	−.40		−.02	−.57		−.04	−1.02	
Incremental theory	.14***	2.84		.10	2.41		.07	1.72		.03	.66	
Entity theory	.08	1.72		−.08	−2.13		−.07	−1.70		−.03	−.83	
Mastery-approach goals	.11	1.72		.51***	10.13		.53***	10.36		.55***	11.31	
Mastery-avoidance goals	−.13	−1.88		.04	.76		−.01	−.11		−.05	−.91	
Performance-approach goals	.17***	2.65		−.11	−2.04		−.12	−2.34		.01	.13	
Performance-avoidance goals	−.02	−.29		.19***	3.29		.05	.85		.09	1.49	

Note. **$p < .01$.
***$p < .001$.

Hierarchical regressions predicting students' academic engagement

Agentic engagement

Results of hierarchical regression analyses predicting the four dimensions of academic engagement are displayed in Table 3. In this section of analyses, teachers' autonomy support and parental psychological control were entered in the first step and explained a significant amount of variance (20%) in students' agentic engagement, $F(2, 399) = 50.01$, $p < .001$. Teachers' autonomy support emerged as the only significant predictor of agentic engagement, $\beta = .44$, $p < .001$. In Step 2, students' implicit theories of intelligence were included in the model. Adding these variables increased the amount of variance explained for agentic engagement by 3%, $F(4, 397) = 29.50$, $p < .001$. When controlling for the variables entered in the first step, incremental theory of intelligence was positively related to agentic engagement, $\beta = .18$, $p < .001$. Entity theory failed to predict students' agentic engagement. In Step 3, the four types of achievement goal orientations were entered. Adding these variables increased the amount of variance explained for agentic engagement by 3%, $F(8, 393) = 17.16$, $p < .001$. In addition to teachers' autonomy support ($\beta = .35$, $p < .001$) and the incremental theory of intelligence ($\beta = .14$, $p < .01$), performance-approach goal orientation also positively predicted agentic engagement, $\beta = .17$, $p < .001$. The independent variables entered in the final regression model in total explained 26% of the variance in agentic engagement. Cohen (1988) developed benchmark values for the effect size of regression and categorized R^2 from 0.02 to 0.13 as weak (small), from 0.13 to 0.26 as moderate (medium), and $R^2 >$ 0.26 as substantial (large) effects. Based on the criteria, the predicting effects of the independent variables on agentic engagement were moderate. The hypothesis regarding determinants of this aspect of engagement was partially supported. Teachers' autonomy support, incremental theory of intelligence, and performance-approach goal orientation emerged as significant predictors.

Behavioral engagement

The amount of variance (24%) explained by teachers' autonomy support and parental psychological control in the first step of the analysis was significant for students' behavioral engagement, $F(2, 399) = 62.95$, $p < .001$. Teachers' autonomy support was found to be positively associated with students' behavioral engagement, $\beta = .49$, $p < .001$. Adding implicit theories of intelligence in Step 2 increased the amount of variance explained for behavioral engagement by 6%, $F(4,$

397) = 42.73, $p < .001$. When the predictors entered in the first step were controlled for, the incremental theory of intelligence emerged as a positive predictor of behavioral engagement, $\beta = .24$, $p < .001$. In Step 3, the four types of achievement goal orientations were entered. Adding achievement goals increased the amount of variance explained for behavioral engagement by 23%, $F(8, 393) = 55.49$, $p < .001$. Among the four types of goal orientations, both mastery-approach and performance-avoidance goal orientations positively predicted students' behavioral engagement, $\beta = .51$, $p < .001$, and $\beta = .19$, $p = .001$, respectively. Teachers' autonomy support remained to significantly predict behavioral engagement ($\beta = .15$, $p = .001$) when controlling for the variables entered in the first and second steps. The independent variables entered in the final model in total explained 53% of the variance in behavioral engagement. According to Cohen's (1988) benchmarks, the effects of these predictors in the final regression model were rather large. The hypothesis regarding predictors of this aspect of engagement was partially confirmed. The significant predictors of behavioral engagement included teachers' autonomy support, incremental theory of intelligence, mastery-approach, and performance-avoidance goal orientations.

Emotional engagement

In the first step of the analysis, teachers' autonomy support and parental psychological control were entered and accounted for a significant amount of variance (30%) in emotional engagement, $F(2, 399) = 84.77$, $p < .001$. Teachers' autonomy support was positively associated with emotional engagement, $\beta = .54$, $p < .001$. Results from Step 2 indicated that adding implicit theories of intelligence increased the amount of variance explained by 3% for emotional engagement, $F(4, 397) = 51.31$, $p < .001$. When the predictors entered in Step 1 were controlled for, incremental theory of intelligence positively predicted students' emotional engagement, $\beta = .19$, $p < .001$. In the final step, students' four types of achievement goal orientations were included. Adding these variables increased the amount of variance explained for emotional engagement by 17%, $F(8, 393) = 50.75$, $p < .001$. When the variables entered in Step 1 and 2 were taken into consideration, mastery-approach goal orientation was the only type of achievement goal that significantly predicted emotional engagement, $\beta = .53$, $p < .001$. Teachers' autonomy support was still a positive predictor of emotional engagement, $\beta = .28$, $p < .001$. The independent variables entered in the final model altogether accounted for half of the variance in emotional engagement. On the basis of Cohen's (1988) benchmarks, the predicting effects of these independent variables on emotional engagement were substantial. The hypothesis regarding predictors of emotional engagement was partially confirmed. Teachers' autonomy support, incremental theory of intelligence, and mastery-approach goal orientation functioned as significant predictors.

Cognitive engagement

Teachers' autonomy support and psychological control were entered in the first regression model and accounted for a significant amount of variance (31%) in students' cognitive engagement, $F(2, 399) = 88.91$, $p < .001$. Teachers' autonomy support emerged as the only significant predictor of cognitive engagement, $\beta = .55$, $p < .001$. Adding implicit theories of intelligence in Step 2 increased the amount of variance explained for cognitive engagement by 3%, $F(4, 397) = 50.64$, $p < .001$. The incremental theory of intelligence was positively correlated with cognitive engagement, $\beta = .18$, $p < .001$. Entity theory, on the other hand, failed to predict any aspect of academic engagement in the current study. In Step 3, the four types of achievement goal orientations were entered. Adding these variables increased the amount of variance explained for cognitive engagement by 22%, $F(8, 393) = 61.51$, $p < .001$. Among the four types of achievement goal orientations, mastery-approach goal was the only predictor of cognitive engagement, $\beta = .55$, $p < .001$. Teachers' autonomy support remained to positively predict this dimension of engagement, $\beta = .25$, $p < .001$. The independent variables entered in the final model in total explained 56% of the variance in cognitive engagement. Based upon Cohen's (1988) benchmarks, there were again fairly strong effects of these predictors on cognitive engagement. Clearly, in terms of such outcome variables as behavioral, emotional, and cognitive engagement, these independent variables showed better predictability. The hypothesis regarding predictors of cognitive engagement was partially confirmed. Teachers' autonomy support, incremental theory of intelligence, and mastery-approach goal orientation significantly predicted cognitive engagement.

Hierarchical regressions predicting students' achievement goal orientations

Mastery-approach goal orientation

Table 4 displays the results of regressions predicting students' achievement goal orientations. Teachers' autonomy support and parental psychological control were entered in the first regression model and accounted for a significant amount of variance (26%) in mastery-approach goal orientation, $F(2, 399) = 70.03$, $p < .001$. Teachers' autonomy support positively predicted students' mastery-approach goal orientation, $\beta = .51$, $p < .001$. In Step 2, students' implicit theories of intelligence were included in the model. Adding these variables increased the amount of variance explained for mastery-approach goal orientation by 6%, $F(4, 397) = 46.93$, $p < .001$. When the predictors entered in the first step were controlled for, the incremental theory of intelligence positively predicted mastery-approach goal orientation, $\beta = .26$, $p < .001$. Teachers' autonomy support remained to be a strong positive predictor of mastery-approach goal orientation, $\beta = .43$, $p < .001$. The independent variables entered in the final regression model altogether explained 32% of the variance in mastery-approach goal orientation. According to the benchmarks suggested by Cohen (1988), the effects of the independent variables on

Table 4. Summary of hierarchical regression analyses predicting achievement goal orientations (N = 402).

	Mastery-approach goals			Mastery-avoidance goals			Performance-approach goals			Performance-avoidance goals		
Variable	β	t	$\triangle R^2$	β	t	$\triangle R^2$	β	t	$\triangle R^2$	β	t	$\triangle R^2$
Step 1			.26			.23			.16			.19
Teachers' support	.51**	11.83		.45***	10.32		.37***	7.95		.38***	8.48	
Parental control	.02	.42		.20***	4.48		.20***	4.27		.25***	5.55	
Step 2			.06			.04			.05			.05
Teachers' support	.43***	9.77		.40***	8.82		.30***	6.29		.34***	7.32	
Parental control	.01	.08		.15***	3.29		.15***	3.19		.19***	4.07	
Incremental theory	.26***	5.76		.19***	3.98		.23***	4.75		.20***	4.25	
Entity theory	−.01	−.10		.14***	3.10		.13***	2.60		.16***	4.30	

Note.
**$p < .01$.
***$p < .001$..

mastery-approach goal orientation were substantial. The hypothesis regarding factors related to this type of goal orientation was partially supported. Teachers' autonomy support and incremental theory of intelligence significantly predicted mastery-approach goal orientation.

Mastery-avoidance goal orientation

Variables entered in Step 1 (i.e., teachers' autonomy support and parental psychological control) predicted a significant amount of variance (23%) in mastery-avoidance goal orientation, $F(2, 399) = 60.21$, $p < .001$. Both teachers' autonomy support and parental psychological control positively predicted mastery-avoidance goal orientation, $\beta = .45$, $p < .001$, and $\beta = .20$, $p < .001$, respectively. Results from the second step of the analysis indicated that adding implicit theories of intelligence increased the amount of variance explained in mastery-avoidance goal orientation by 4%, $F(4, 397) = 36.55$, $p < .001$. When the variables entered in Step 1 were accounted for, both incremental and entity theories of intelligence positively predicted mastery-avoidance goal orientation, $\beta = .19$, $p < .001$, and $\beta = .14$, $p = .001$, respectively. Teachers' autonomy support and parental psychological control remained to positively predict mastery-avoidance goal orientation, $\beta = .40$, $p < .001$, and $\beta = .15$, $p = .001$, respectively. In total, the independent variables entered in the final regression model explained 27% of the variance in mastery-avoidance goal orientation. The predicting effects of the independent variables on this type of goal orientation were more than moderate based upon Cohen's (1988) benchmarks. And the hypothesis regarding predictors of mastery-avoidance goal orientation was fully confirmed. Teachers' autonomy support, parental psychological control, and students' implicit theories all significantly predicted this type of goal orientation.

Performance-approach goal orientation

The amount of variance (16%) explained by teachers' autonomy support and parental psychological control in the first step of the analysis was significant for students' performance-approach goal orientation, $F(2, 399) = 38.43$, $p < .001$. Teachers' autonomy support and parental psychological control both positively predicted performance-approach goal orientation, $\beta = .37$, $p < .001$, and $\beta = .20$, $p < .001$, respectively. Results from Step 2 indicated that adding implicit theories of intelligence increased the amount of variance explained by 5% for performance-approach goal orientation, $F(4, 397) = 26.39$, $p < .001$. When the predictors entered in the first step were accounted for, both incremental and entity theories of intelligence positively predicted performance-approach goal orientation, $\beta = .23$, $p < .001$, and $\beta = .13$, $p < .01$, respectively. Teachers' autonomy support and parental psychological control were still positive predictors of performance-approach goal orientation, $\beta = .30$, $p < .001$, and $\beta = .15$, $p = .001$, respectively. The independent variables entered in the final model in total explained 21% of the variance in performance-approach goal orientation. Although the effects of these independent variables in the regression model were merely moderate (Cohen, 1988), the hypothesis regarding predictors of performance-approach goal orientation was fully confirmed. Teachers' autonomy support, parental psychological control, and students' implicit theories all emerged as significant predictors.

Performance-avoidance goal orientation

Teacher' autonomy support and parental psychological control were entered in the first regression model and accounted for a significant portion of the variance (19%) in performance-avoidance goal orientation, $F(2, 399) = 48.22$, $p < .001$. Both teachers' autonomy support ($\beta = .38$, $p < .001$) and parental psychological control ($\beta = .25$, $p < .01$) emerged as significant predictors of performance-avoidance goal orientation. Results from Step 2 indicated that adding implicit theories of intelligence increased the amount of variance explained by 5% for performance-avoidance goal orientation, $F(4, 397) = 31.31$, $p < .001$. When the predictors entered in Step 1 were controlled for, both incremental and entity theories of intelligence positively predicted performance-avoidance goal orientation, $\beta = .20$, $p < .001$, and $\beta = .16$, $p < .001$, respectively. Teachers' autonomy support and parental psychological control remained to positively predict students' performance-avoidance goal orientation, $\beta = .34$, $p < .001$, and $\beta = .19$, $p < .001$. The independent variables entered in the final model in total accounted for 24% of the variance in performance-avoidance goal orientation. The effects of independent variables on performance-avoidance goal orientation were simply moderate on the basis of Cohen's (1988) benchmarks, but the hypothesis regarding determinants of this type of goal orientation was fully supported. The significant predictors of

performance-avoidance goal orientation included teachers' autonomy support, parental psychological control, and students' implicit theories.

Discussion

Results of the present study broaden the understanding of the antecedents of adolescents' academic engagement. Although research on academic engagement has drawn much attention among educational scholars, little research has examined the reliable predictors of agentic, behavioral, emotional, and cognitive engagement within the Eastern Asian cultural context. Results of hierarchical regression analyses indicate that autonomy support from teachers along with incremental theory of intelligence positively predict all the four components of academic engagement. In terms of achievement goal orientations as the antecedents of academic engagement, mastery-approach goal orientation is positively related to behavioral, emotional, and cognitive engagement. Performance-approach goal orientation positively predicts agentic engagement, whereas performance-avoidance goal orientation is positively associated with behavioral engagement. Additionally, the current research sheds light on the determining factors of Taiwanese adolescents' achievement goal orientations. Results of this study suggest that teachers' autonomy support versus parental psychological control as well as students' incremental versus entity theories of intelligence all positively predict mastery-avoidance, performance-approach, and performance-avoidance goal orientations. In regard to mastery-approach goal orientation, autonomy support from teachers and incremental theory emerge as positive predictors of the very type of achievement goal. Below, several important findings are discussed in more detail.

Predictors of academic engagement

Results of hierarchical regression analyses reveal the crucial role of teachers' autonomy support in Taiwanese adolescents' academic engagement. In consistence with previous findings (Assor et al., 2002), autonomy support in the classroom context positively predicts all the four dimensions of students' academic engagement. Further, receiving autonomy support from teachers accounts for nearly one third of the variance in students' emotional and cognitive engagement. Based on the well-known benchmarks established by Cohen (1988), the values of R^2 greater than 0.26 are considered substantial. These findings thus suggest the beneficial effects of satisfying adolescent students' need for autonomy in the academic setting on their emotion and use of sophisticated learning strategies. Also, the present findings lend support to the universality of the contention of self-determination theory that students are more fully engaged in learning when they are motivated by personal interest and personal volition (Vansteenkiste et al., 2005). In the Taiwanese cultural context, it is autonomy support from teachers rather than parental expectations (i.e., parental psychological control) that exerts positive influences on students' agentic, behavioral, emotional, and cognitive engagement in academic tasks. Despite the findings that Taiwanese students are likely to act primarily in accordance with anticipated expectations of parents (Yang, 1997), parental psychological control fails to predict adolescent students' optimal academic functioning.

In terms of implicit theories of intelligence as the predictors of academic engagement, incremental theory of intelligence is found to be positively associated with students' agentic, behavioral, emotional, and cognitive engagement. As expected, the belief that intelligence can be increased appears to motivate these incremental theorists to engage in self-regulation characterized by proactive learning, effort expenditure, positive emotions, and cognitive strategy use. It is noteworthy, nevertheless, that after controlling for teachers' autonomy support, the effects of incremental theory of intelligence on all the four components of academic engagement are rather weak.

The relationships between achievement goal orientations and academic engagement vary according to the different components of engagement. For agentic engagement, performance-approach goal orientation is the only significant predictor. Other types of goal orientations fail to predict agentic engagement. Students who pursue performance-approach goals to show their abilities or skills tend to seek to enrich and personalize the instruction they receive (Reeve, 2012). It may be that the learning conditions tailored according to these students' preferences allow them to more easily demonstrate their competence relative to other classmates. As for behavioral engagement, intriguingly, both mastery-approach and performance-avoidance goal orientations positively predict this aspect of engagement. The pursuit of increasing one's competence or achieving task mastery may, needless to say, give rise to students' on-task attention, persistence, and perseverance (i.e., behavioral engagement) when encountering academic difficulties. It is unexpected that performance-avoidance goal orientation emerges as a positive predictor of behavioral engagement in the current study.

A possible explanation for such an unforeseen relationship may be that the fear of failure underlying performance-avoidance goal orientation prompts students to put effort in schoolwork characterized as behavioral engagement in order not to appear incompetent or less able than others. As stated earlier, in the Taiwanese classroom environment, the pressures to excel in schoolwork are intense. Perhaps performance-avoidance goal orientation would function as an antecedent of behavioral engagement in the very context. More research is needed to corroborate this speculation. Mastery-approach goal orientation is the only type of achievement goal that positively predicts emotional and cognitive engagement. Adopting this type of goal to develop or improve one's own competence not only facilitates behavioral engagement, but also brings about adaptive emotions (e.g., enthusiasm, enjoyment, fun, and satisfaction) and the use of deep cognitive strategies as students engage in academic activities. Moreover, the magnitude of the effects of mastery-approach goals on these three aspects of

engagement is sizable. These findings clearly illustrate the inseparable link between mastery-approach goals and academic engagement.

Predictors of achievement goal orientations

With respect to predictors of achievement goal orientations, both autonomy support from teachers and incremental theory of intelligence are positively related to mastery-approach goal orientation. Parental psychological control and entity theory fail to predict this type of goal orientation. SDT posits that meeting the individuals' need for autonomy fosters optimal learning and academic functioning (Black & Deci, 2000; Williams & Deci, 1996). The classroom environment conducive to autonomy need satisfaction in effect positively predicts mastery-approach goal orientation. Moreover, given that incremental theorists believe that intelligence is malleable and can be increased, this theory of intelligence is likely to lead these students to adopt mastery-approach goals in order for developing their intellectual ability.

Interestingly, the other three types of achievement goal orientations are predicted by teachers' autonomy support and parental psychological control as well as incremental and entity theories of intelligence. These current findings suggest that mastery-avoidance, performance-approach, and performance-avoidance goal orientations may all stem from hybrid motivation. Whether students are focused on avoiding losing skills or a lack of task mastery (mastery-avoidance goal orientation), demonstrating their ability relative to others or proving their self-worth (performance-approach goal orientation), or avoiding appearing incompetent (performance-avoidance goal orientation), teachers' autonomy support versus parental psychological control coupled with incremental versus entity theories all function as positive predictors of these goal orientations. On the one hand, these types of achievement goals are related to the classroom environment satisfying students' need for autonomy and the belief that intelligence can be increased, predictors that are commonly regarded as adaptive factors. On the other hand, mastery-avoidance, performance-approach, and performance-avoidance goal orientations are also positively predicted by parental psychological control and entity theory of intelligence. In the psychologically controlling environment, students' self-esteem often depends on their performance (Deci & Ryan, 1987). Similarly, entity theorists are inclined to view poor performance as the implied negative evaluation of the self (Dweck & Molden, 2005). Because of the highly ego-involved nature of psychological control and the entity view of intelligence, these predictors are positively associated with not only performance goal orientations (i.e., performance-approach and performance-avoidance goals), but also avoidance-based motivation (i.e., mastery-avoidance and performance-avoidance goals).

Implications for education

Results of the present research indicate that teachers' autonomy support, incremental theory of intelligence, and mastery-approach goal orientation are the most significant factors that contribute to students' academic engagement. Further, teachers' autonomy support along with incremental theory serve as primary determinants of mastery-approach goal orientation. In other words, to foster students' academic engagement and mastery-approach goal orientation, teachers are advised to provide support for autonomy in the classroom setting. When teachers engage in autonomy-supportive practices mentioned previously (e.g., taking the student's perspective or allowing opportunities for self-initiation and choice), students are likely to experience their interactions with academic activities and materials as more self-determined. The self-determined motivation should lead them to pursue mastery-approach goals and earnestly engage in schoolwork.

As for the cultivation of incremental theory of intelligence, an effective way should be to counteract the socialization experiences from which entity theory is thought to originate. When the primary socializing agents (e.g., parents or teachers) express their love or affection contingently upon the child's performance, entity view about intelligence may arise (Dweck, 2000). In the classroom context, teachers can provide mastery-oriented motivational support through explicitly conveying to students that making mistakes is a natural part of learning. In an environment where students feel free to take risks, make mistakes, and try again on their way to success without worrying about putting their self-worth in jeopardy, incremental theory of intelligence is supposed to be nurtured (Turner, Meyer, Midgley, & Patrick, 2003).

Limitations and future research

Although results of the present study provide insights into educational practices, there are several limitations that need to be addressed in the future research. First, the present findings draw attention to the critical role of autonomy support from teachers in all the four components of adolescent students' academic engagement. Future research can also examine the influences of parental autonomy support simultaneously and compare the magnitudes of effects of autonomy support in the classroom and family contexts on students' academic engagement. Second, a closer look at the results from hierarchical regressions suggests that achievement goal orientations, mastery-approach goal orientation in particular, may mediate the relationships between incremental theory of intelligence and different aspects of academic engagement. The regression procedures employed in the present study, however, are unable to examine the mediating relationships. Future research using structural equation modeling to test the path model is encouraged. Finally, even though findings of the current research show the considerable effects of autonomy support from teachers on students' academic engagement, this study is cross-sectional and correlational in nature such that the cause-and-effect relationship cannot be established. Experimental studies that explore the hypothesized cause-and-effect model are needed. This research design should advance our understanding of

effective interventions that may promote student engagement in the academic context.

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