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Academic Expectations Stress Inventory
Development, Factor Analysis, Reliability, and Validity

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This article describes the development and initial validation of obtained scores from the Academic Expectations Stress Inventory (AESI), which measures expectations as a source of academic stress in middle and high school Asian students. In the first study, exploratory factor analysis results from 721 adolescents suggested a nine-item scale with two factors—Expectations of Parents/Teachers (five items) and Expectations of Self (four items). The data also revealed initial evidence of the reliability of AESI’s scores. Initial estimates of convergent validity for AESI’s scores were also reported. In the second study, data from 387 adolescents were subjected to a confirmatory factor analysis that provided support for the factor structure derived from the first study. In the third study, data from 144 adolescents yielded evidence of AESI scores’ test-retest reliability. Additional evidence of AESI’s internal consistency estimates as well as convergent and discriminant validity for AESI’s scores were also provided.

**Keywords:** exploratory factor analysis; confirmatory factor analysis; academic stress; Asian

Asian American students’ consistently high achievement patterns have been well documented, and their educational performance often exceeds that of White, African American, and Hispanic students (Sue & Okazaki, 1990). Steinberg, Dornbusch, and Brown (1992) found that in comparison to students from other ethnic groups, Asian American students devoted relatively more time to their studies and were more likely to report that their parents have high expectations and standards for their school performance. Specifically, Asian American students were found to spend twice as much time each week on homework than students of other ethnic groups and reported that their parents would be upset if they came home with anything less than an

**Authors’ Note:** The authors gratefully acknowledge the helpful and constructive suggestions made by the reviewers and the associate editor, Robin K. Henson. Address correspondence to Rebecca P. Ang, Division of Psychology, School of Humanities and Social Sciences, Nanyang Technological University, Nanyang Avenue, Singapore 639798; e-mail: rpang@ntu.edu.sg.
African American and Hispanic students, in contrast, performed less well in school, were found to devote less time to their studies, and were more likely to report that their parents had relatively lower expectations and standards for their school performance (Steinberg et al., 1992). Through structured interviews with Asian American students, Mordkowitz and Ginsburg (1987) found Asian families to strongly emphasize the need to succeed educationally, and these findings were similar to Steinberg et al.’s. Specifically, Asian families considered schooling of primary importance and placed high demands and expectations for educational achievement (Mordkowitz & Ginsburg, 1987).

This pressure to succeed and to do well academically is even more acutely felt in Asian societies worldwide (e.g., Korea, Hong Kong, and Singapore). For example, Korean 12th graders reported more than twice the time their American counterparts reported in completing schoolwork (Lee & Larson, 2000). Conversely, American 12th graders spent more than twice as much time in socializing and leisure activities compared to Korean 12th graders (Lee & Larson, 2000). In Korea, graduating from a high-ranking university is a passport to a good job, high wages, and high social status (Chung, Kim, Lee, Kwon, & Lee, 1993); hence, Korean students spend large amounts of time studying after school and on weekends, and leisure was comparatively rare. Hence, it was not surprising that Juon, Nam, and Ensminger (1994) found academic stress to be one of the predictors of suicidal behaviors among Korean adolescents.

Likewise, adolescents in Singapore face a highly stressful educational environment. In a study investigating key issues facing Singapore youth, 220 high school students in Singapore ranked “being pressured to keep up with schoolwork” as the top problem or concern they had (Isralowitz & Ong, 1990). In a recent national youth survey conducted in Singapore, K. C. Ho and Yip (2003) found that a majority of young people ranked education as the most stressful aspect of their lives. Furthermore, when asked to rank the importance and satisfaction level of seven different aspects of school life, youths overwhelmingly ranked examination grades as the most important aspect of school life but reported being the least satisfied with it. This suggests that whereas youths considered examination grades to be the most important aspect of school life, they felt that they could not attain standards that were perceived to be satisfactory.

Taken together, these findings from studies conducted with Asian and Asian American students suggest that whereas striving for academic excellence may result in certain positive outcomes for these adolescents, it is equally important to recognize that negative consequences such as excessive stress and mental health problems are also clearly evident (Shek, 1995). Large-scale national youth surveys and interviews with youth conducted in Singapore indicated that pressure surrounding education and schoolwork reflected the stress associated with succeeding in school and getting a job that pays well and has high status (K. C. Ho & Yip, 2003; Isralowitz & Ong, 1990). In a comparative study of subjective well-being, Korean adolescents were found to report more negative emotions regarding education than adolescents from nearly all other Western nations (Diener, Suh, Smith, & Shao, 1995). Lee and Larson (2000) investigated the relationship between academic stress and depression; they employed a con-
sistent clinical criterion and found 36% of Korean students to be clinically depressed in the sample, compared to 16% of American students. Likewise, Sastry and Ross (1998) found Asians in Asia to have higher levels of anxiety and depression than individuals from non-Asian countries. In the same vein, several other research studies have also documented higher levels of distress in Asian American students compared with White American students (Abe & Zane, 1990). Collectively, empirical findings point to the need to succeed academically as a major source of stress and may contribute to mental health problems especially for Asian and Asian American students.

Researchers have sought to provide an explanation for the twin findings of the educational achievements of and the high level of academic stress experienced by the Asian and Asian American students. The most common cultural view reviewed in the literature is that Asian family values and socialization practices emphasize the need to succeed educationally (Sue & Okazaki, 1990). In accordance with Confucian ideals, Chinese parents place great emphasis on filial piety, education, and proper behavior (D. Y. F. Ho, 1981; Shek & Chan, 1999). Filial piety is the primary guiding principle of socialization practices (D. Y. F. Ho, 1981). Respect for parents and obedience are highly valued, and filial piety may also be generalized to authority relationships beyond the family (D. Y. F. Ho, 1996). In Asian cultures, shame and its attendant loss of face are frequently used as socialization tools to reinforce familial and cultural obligations, societal expectations, and proper behavior (Yeh & Huang, 1996). Loss of face is a very powerful social control mechanism for Asians because when one loses face, one feels tremendous shame, which is shared by the entire family, as well as feelings of inferiority for not attaining the goals and ideals defined by the family (D. Y. F. Ho, 1976; Toupin, 1980). Not meeting one’s own expectations and the expectations of significant others is a serious matter that could potentially result in loss of face and loss of confidence and support from one’s family and even the community (Yeh & Huang, 1996). Therefore, children are socialized to be hypersensitive to the judgment of others, especially significant others such as parents or teachers. Academic achievement is extremely important because it is perceived as one of the few avenues for upward mobility and expanded options; thus, the significance that individuals and families attribute to academic success is intensified (Gloria & Ho, 2003; D. Y. F. Ho, 1994; Sue & Okazaki, 1990). In a study investigating the perceptions of an ideal child, approximately 60% of Hong Kong Chinese parents listed family-related (e.g., fulfillment of family responsibilities) and academic-related attributes (e.g., fulfillment of responsibility in studying) as characteristics of the ideal child (Shek & Chan, 1999). These findings are consistent with the observation that filial piety, family orientation, and education are strongly emphasized in the Asian culture (Yang, 1981).

In addition, Asian students’ concepts of the self are more collective than those of Caucasian students (Higgins & King, 1981). Furthermore, Asians tend to be relatively high self-monitors, whereas Caucasians tend to be relatively low self-monitors (Triandis, 1989). Therefore, because Asians respond strongly to the judgments and demands of the familial and social environment, external influences feature very
strongly in their perceptions, feelings, and behavior (Gloria & Ho, 2003; Yeh & Huang, 1996). Integrating these findings in the context of academic stress, it appears that in addition to Asian students putting pressure on themselves to excel academically, they also strive hard to fulfill familial obligations and the academic expectations of significant others such as parents and teachers.

In contrast, for studies using non-Asian samples (e.g., Caucasian students), although academic stress is sometimes linked to test taking, exams, time pressure, and future plans, expectations of parents as a factor in contributing to academic stress is almost nonexistent (e.g., Akgun & Ciarrochi, 2003; Schafer, 1996). Michie, Glachan, and Bray (2001) found that students who believed that peers judged them to be academically less able experienced higher levels of academic stress. In addition, students who wanted to return to school to pursue professional advancement also put more pressure on themselves to perform better, and they, too, experienced a higher level of academic stress (Michie et al., 2001). Higher academic stress among American and Australian students was also associated with lower course grades and taunting and teasing from peers about being a “nerd” (Struthers, Perry, & Menec, 2000; Wenz-Gross, Untch, & Widaman, 1997). Students’ own academic expectations and performance have also been found to be associated with higher levels of academic stress (Abouserie, 1994; Heins, Fahey, & Leiden, 1984). Collectively, these findings indicate that in a Western context, academic stress experienced by non-Asian students appear to encompass similar aspects of school-related stressors as those experienced by Asian students with the exception of one major difference, which is the absence of stress arising from the need to excel academically to fulfill parental expectations and to avoid the loss of face.

At present, no instruments exist to adequately measure expectations as a source of academic stress in middle and high school Asian students. The Academic Stress Questionnaire (ASQ; Abouserie, 1994), Academic Stress Scale (ASS; Kohn & Frazer, 1986), and Student Stress Inventory (SSI; Zeidner, 1992) all obtain information about general academic stress among college or undergraduate students. Only two scales reviewed were designed for use with middle and high school students, and they are School Stressors Inventory for Adolescents (SSIA; Fanshawe & Burnett, 1991) and High School Stressors Scale (HSSS; Burnett & Fanshawe, 1997), respectively. All the scales listed were developed in the West, and these scales were not designed to tap into expectations of self, parents, and teachers, which were reviewed to be powerful, meaningful, and salient in the lives of Asian students. For example, only two of the five academic stress inventories listed had one or two items that specifically measured expectations of parents, which was reviewed to be one of the major facets of academic stress experienced by Asian students.

Another issue concerns the use of appropriate statistical procedures for the development and validation of questionnaires. With the exception of the HSSS (Burnett & Fanshawe, 1997), all other scales were constructed with sole reliance on the use of exploratory factor analysis (EFA). The EFA approach has been criticized for having statistics rather than theory determine the structure of scale scores and for not ade-
quately assessing error (Gorsuch, 1983; Henson, Capraro, & Capraro, 2004; Thompson & Daniel, 1996). Dickey (1996) argued that it is therefore important that EFA itself cannot be used as a basis for a final determination regarding an underlying construct, because the analysis is designed to maximize the amount of variance within the current variable set, and subsequent analyses with other data sets may not reproduce the same factor structures. Given these various constraints and limitations of existing instruments reviewed, it was therefore necessary to develop an empirically validated academic stress inventory specifically measuring expectations, for use with middle and high school Asian students.

**Study 1: EFA and Initial Validation**

**Method**

**Purpose**

The purpose of Study 1 was threefold: (a) to generate an initial pool of items for a scale to measure the construct of academic stress among adolescents arising from self-expectations, parent-expectations, and teacher-expectations; (b) to conduct an EFA to assess the factor structure of the scale items; and (c) to investigate the initial estimates of internal consistency and construct validity of the AESI scores.

**Scale Construction**

The construct being measured was defined as expectations (from self, parents, or teachers) as a source of academic stress experienced by middle and high school adolescents. We developed the construct definition based on a review of the relevant literature in the area of academic stress as it relates to adolescents’ perception of self-expectations and other-expectations. An initial pool of 15 items was generated to tap into the facets of stress arising from academic expectations among adolescent students. Items that were agreed upon by two independent reviewers experienced in the scale development process as congruent with the content domain were retained. Two items were dropped because of redundancy, and 3 items were reworded for clarification, resulting in a 13-item inventory. Two items were reverse-scored to minimize potential response bias. The response format for the AESI is a Likert-type scale ranging from 1 (*never true*) to 5 (*almost always true*). Items were scored such that higher scores indicated greater perceived academic stress from these expectations.

**Participants**

A sample of 721 adolescents (388 males and 329 females, 4 individuals did not provide gender information) from a secondary school in Singapore participated in the study. The sample consisted of students from Grades 7 through 10, and participants’ ages ranged from 12 to 18 years ($M = 14.44$, $SD = 1.01$). Self-reported ethnic identifi-
cation for the sample was as follows: Of the participants, 77.3% were Chinese, 3.1% were Indian, 16% were Malay, 2.6% endorsed Other (all other ethnic groups not listed), and 1% did not provide information on ethnicity.

**Measures**

*The preliminary AESI.* The initial version of AESI consisted of 13 items that measured academic stress among adolescent students arising from self-expectations, parent-expectations, and teacher-expectations. Higher scores indicated higher perceived academic stress.

*Fear of Negative Evaluation Scale–Brief Version (FNE-Brief).* The FNE-Brief (Leary, 1983a) is a 12-item version of the original 30-item FNE scale (Watson & Friend, 1969) that measured the degree to which people experienced anxiety or apprehension at the prospect of being evaluated negatively. The scale used a Likert-type response format with choices ranging from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*), and scores were summed with higher scores reflecting greater levels of anxiety or fear. The Cronbach’s alpha for the sample was .77. Scores from FNE-Brief have been shown to be highly correlated with scores from the original FNE scale (Leary, 1983a). In addition, scores from both the FNE-Brief and FNE scales have shown expected relationships with scores from other established scales measuring a similar construct (Durm & Glaze, 2001; Leary, 1983b).

*Children’s Depression Inventory–Short Form (CDI-Short).* The CDI-Short (Kovacs, 1992) is the 10-item brief version of the 27-item inventory that measured a variety of self-reported depressive symptoms in children and adolescents. Each CDI item consisted of three choices, keyed 0 (*absence of symptom*), 1 (*mild symptom*), or 2 (*definite symptom*), with higher scores indicating more severe self-reported depressive symptoms. The Cronbach’s alpha for the sample was .83. Having been used in many clinical and research studies, the validity of CDI scores have been well established (e.g., Barreto & McManus, 1997; Stark & Laurent, 2001). In addition, scores from CDI-Short are highly correlated with scores from the original 27-item CDI.

**Consent and Procedure**

In Singapore, permission for conducting research and data collection is typically granted by the school principal. Approval was sought and obtained for the researchers to conduct the research investigation at the school prior to data collection. The purpose of the study was explained to the students, and consent to participate in the study was obtained from all students involved. Participation was strictly voluntary, and students’ responses were kept confidential. Students were also informed that they could refuse or discontinue participation at any time. All questionnaires were administered in English. No translation is needed as English is the medium of instruction for all schools in Singapore.
Results

EFA

Prior to conducting the EFA, we examined two indicators to determine whether the sample was appropriate for such an analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy index was .89, and Bartlett’s test of sphericity was significant, $\chi^2(78, N = 721) = 4,175.73, p < .0001$, indicating that the sample and correlation matrix were appropriate for such an analysis. Principal components analysis with an oblique rotation was performed on the scores of the 13-item AESI. An oblique rotation was used because we expected the factors to be correlated. We based the decision about number of factors to retain on a combination of methods (e.g., parallel analysis, eigenvalue > 1.0, scree plots) as well as conceptual clarity, interpretability and theoretical salience of the rotated factors, and simple structure. In this study, the various methods used to determine factor retention indicated that two factors be retained for the final solution. Our goal was to have the smallest number of possible factors and for each item to have a substantial pattern coefficient on only one latent factor. Items should preferably weight greater than .4 on the relevant factor and less than .4 on all other factors (Stevens, 1996). Of the 13 items, 4 (inclusive of the 2 reverse-scored items) were dropped from subsequent analyses because they either had extremely low item-total correlations or they had high coefficients on more than one factor. These procedures resulted in a 9-item instrument that accounted for 65.92% of the variance in AESI scores.

As expected, the rotated factors had scores that were correlated ($r = .65$). The factor pattern and factor structure coefficients are presented in Table 1, along with communalities ($h^2$) and means and standard deviations of the measured variables. All nine items had communalities of at least .50. The first factor consisted of five items, was labeled Expectations of Parents/Teachers, and accounted for 53.74% of the variance. The first factor contained items that reflect the sense of stress, self-blame, and disappointment at not having lived up to the expectations of parents and teachers. The second factor consisted of four items, was labeled Expectations of Self, and accounted for 12.18% of the variance. The second factor contained items that reflect a sense of stress, anxiety, and inadequacy at not having lived up to one’s own expectations. The percentage of variance explained refers to variance accounted for postrotation. Whenever factors are correlated, structure coefficients (correlations of the measured variables with the extracted factors) are also important aids to interpretation (Thompson, 1997; Thompson & Borrello, 1985). Large structure coefficients were obtained for all measured variables on both factors, and this is consistent with the high correlation between the scores of the rotated components.

Internal Consistency

We computed estimates of internal consistency using Cronbach’s coefficient alphas. Scores obtained from the nine-item AESI had a Cronbach’s alpha of .89. The internal consistency estimates for the two factors were as follows: Expectations of...
Parents/Teachers (five items; $\alpha = .85$) and Expectations of Self (four items; $\alpha = .84$). These Cronbach’s alpha estimates appear adequate for general research purposes (Henson, 2001; Nunnally & Bernstein, 1994).

Convergent Validity

We used FNE-Brief (Leary, 1983a) and CDI-Short (Kovacs, 1992) to provide estimates of convergent validity for the AESI scores. We expected that the scores on the nine-item AESI, Factor 1—Expectations of Parents/Teachers and Factor 2—Expectations of Self, would be positively correlated with scores from FNE-Brief and CDI-Short. We expected the construct of academic stress to be more closely aligned with anxiety than with depression; hence, we expected larger correlations between AESI scores and FNE-Brief scores than between AESI scores and CDI-Short scores. As predicted, scores obtained from AESI total ($r = .31$), Expectations of Parents/Teachers ($r = .25$), and Expectations of Self ($r = .32$) were positively correlated with scores from FNE-Brief. Likewise, obtained scores from AESI total ($r = .27$), Expectations of Parents/Teachers ($r = .21$), and Expectations of Self ($r = .30$) were also positively correlated with obtained scores from CDI-Short as expected (see Table 2).

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1 P</th>
<th>Factor 1 S</th>
<th>Factor 2 P</th>
<th>Factor 2 S</th>
<th>$h^2$</th>
<th>$M$</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1: Expectations of Parents/Teachers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. I blame myself when I cannot live up to my parents’ expectations of me.</td>
<td>.75</td>
<td>.80</td>
<td>.10</td>
<td>.52</td>
<td>65.2</td>
<td>2.72</td>
<td>1.30</td>
</tr>
<tr>
<td>2. I feel I have disappointed my teacher when I do badly in school.</td>
<td>.90</td>
<td>.81</td>
<td>–.15</td>
<td>.35</td>
<td>67.6</td>
<td>2.76</td>
<td>1.27</td>
</tr>
<tr>
<td>3. I feel I have disappointed my parents when I do poorly in school.</td>
<td>.83</td>
<td>.83</td>
<td>–.01</td>
<td>.45</td>
<td>68.6</td>
<td>3.31</td>
<td>1.29</td>
</tr>
<tr>
<td>4. I feel stressed when I know my parents are disappointed in my exam grades.</td>
<td>.67</td>
<td>.75</td>
<td>.13</td>
<td>.51</td>
<td>56.9</td>
<td>2.97</td>
<td>1.31</td>
</tr>
<tr>
<td>5. I feel lousy when I cannot live up to my teacher’s expectations.</td>
<td>.70</td>
<td>.75</td>
<td>.09</td>
<td>.48</td>
<td>56.9</td>
<td>2.54</td>
<td>1.23</td>
</tr>
<tr>
<td>Factor 2: Expectations of Self</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I feel stressed when I do not live up to my own standards.</td>
<td>–.13</td>
<td>.41</td>
<td>.97</td>
<td>.90</td>
<td>82.1</td>
<td>3.22</td>
<td>1.25</td>
</tr>
<tr>
<td>7. When I fail to live up to my own expectations, I feel I am not good enough.</td>
<td>.01</td>
<td>.49</td>
<td>.87</td>
<td>.87</td>
<td>75.5</td>
<td>3.25</td>
<td>1.22</td>
</tr>
<tr>
<td>8. I usually cannot sleep and worry when I cannot meet the goals I set for myself.</td>
<td>.22</td>
<td>.56</td>
<td>.60</td>
<td>.72</td>
<td>55.7</td>
<td>2.66</td>
<td>1.28</td>
</tr>
<tr>
<td>9. When I do not do as well as I could have in an examination or test, I feel stressed.</td>
<td>.32</td>
<td>.64</td>
<td>.58</td>
<td>.76</td>
<td>64.7</td>
<td>3.11</td>
<td>1.28</td>
</tr>
</tbody>
</table>

Note: P = Pattern coefficients; S = Structure coefficients; AESI = Academic Expectations Stress Inventory; $h^2 =$ communalities of the measured variables. Pattern coefficients with values of .40 or greater are in bold.

Parents/Teachers (five items; $\alpha = .85$) and Expectations of Self (four items; $\alpha = .84$). These Cronbach’s alpha estimates appear adequate for general research purposes (Henson, 2001; Nunnally & Bernstein, 1994).
Results indicated that participants who perceived greater academic stress from expectations of self and others also experienced greater fear of being evaluated negatively and had higher self-reported symptoms of depression. Generally, the magnitude of the correlations was moderate and corresponded to effect sizes in the medium range (Cohen, 1988).

**Study 2: Confirmatory Factor Analysis**

**Method**

**Purpose**

The purpose of Study 2 was to test the factor structure of the scores obtained from the nine-item AESI that was determined in Study 1, with an independent sample, through the use of confirmatory factor analysis.

**Participants**

Participants were 387 students (208 males and 179 females) from a secondary school in Singapore. The sample consisted of students from Grades 8 and 9 with ages ranging from 13 to 17 years ($M = 14.14, SD = 0.72$). Self-reported ethnic identification for the sample was as follows: Of the participants, 72.6% were Chinese, 2.1% were Indian, 22% were Malay, and 3.3% endorsed Other (all other ethnic groups not listed).

**Measures**

**AESI.** The nine-item AESI was used. Based on Study 1, the inventory has two subscales, Expectations of Parents/Teachers (five items) and Expectations of Self (four items).
Consent and Procedure

The procedures used for obtaining consent, participation, and questionnaire administration were similar to those of Study 1.

Results

Confirmatory Factor Analysis

We used a confirmatory factor analysis to test the stability of scores from the two-factor, nine-item AESI using EQS Version 6.1 (Bentler, 2004). The Cronbach’s alpha estimates for the AESI scores (Total, Expectations of Parents/Teachers, Expectations of Self) in Study 2 were .87, .84, and .83, respectively. The hypothesized two-factor model identified in Study 1 consisted of two first-order latent variables representing two subscales, with each variable having five (Expectations of Parents/Teachers) and four (Expectations of Self) indicators. We analyzed comparisons between this hypothesized two-factor model and a competing one-factor model with all nine items as indicators of the variable. The parameters were estimated using maximum likelihood. An examination of the multivariate chi-square coefficients from the Lagrange Multiplier Test revealed three correlated measurement errors (between Items 2 and 3, 2 and 5, and 6 and 7; see Table 1 for the items). In general, respecification of correlated errors for the purposes of achieving a better fitting model is not an acceptable practice unless the respecification makes both substantive as well as statistical sense (Byrne, 1994). From both these perspectives, it appears reasonable that the three error covariances (E2, E3; E2, E5; E6, E7) should be respecified as freely estimated parameters. Statistically, they yielded large chi-square values; substantively, they represented correlated errors among subscale items of the same measuring instrument, a relatively common finding among attitude and self-report scales in general (e.g., Byrne, 1991, 1993; Newcomb, Huba, & Bentler, 1986; Tanaka & Huba, 1984). In addition, correlation of the error terms could be justified on the basis of the high correlation between the two factors. Thus, both the hypothesized two-factor model and the competing one-factor model were subsequently respecified with these three parameters freely estimated.

Multiple indices provided a comprehensive evaluation of model fit (Hu & Bentler, 1995, 1999). We examined the traditional chi-square fit index. However, given the known dependency of the chi-square statistic on sample size (Bentler & Bonett, 1980; Byrne, 1994), and that the chi-square values are overly stringent in evaluating exact fit (Quintana & Maxwell, 1999), we also examined other fit indices. In this study, the following goodness-of-fit measures were also used: (a) comparative fit index (CFI), (b) Bentler-Bonett normed fit index (NFI), (c) Bentler-Bonett nonnormed fit index (NNFI; also known as Tucker-Lewis Index), (d) incremental fit index (IFI), (e) goodness-of-fit index (GFI), and (f) root mean square error of approximation (RMSEA). Although a value of .90 for CFI, NFI, NNFI, IFI, and GFI has served as a rule-of-thumb lower limit cutoff of acceptable fit, a value of .93 is expected of models considered to be well fitting (Byrne, 1994). RMSEA values of less than .06 indicate a good fit, and values as
Fit indices for the unmodified and modified models are presented in Table 3. The results indicated that the modified two-factor model represented a good fit to the data, with all fit indices indicating a reasonable fit except for RMSEA, which indicated a reasonable fit. In contrast, we compared the modified hypothesized two-factor model with a modified competing one-factor model. The results indicated that although some of the fit indices for the modified competing model were acceptable (i.e., greater than .90 for CFI, NFI, IFI, and GFI), the indices for the modified hypothesized model were universally superior (see Table 3). Taken together, the results of confirmatory factor analyses provided further preliminary support for the factor structure of the AESI scores established in Study 1.

### Study 3: Test-Retest Reliability and Further Estimates of Reliability and Validity

#### Method

**Purpose**

The purpose of Study 3 was to examine the stability of AESI’s scores over time and to provide additional estimates of internal consistency, convergent validity, and discriminant validity of the scores associated with the AESI factors.

**Participants**

Participants were 144 students (72 males and 72 females) from a secondary school in Singapore. The sample consisted of students from Grades 7 through 10, and partici-

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>CFI</th>
<th>NFI</th>
<th>NNFI</th>
<th>IFI</th>
<th>GFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unmodified hypothesized two-factor model</td>
<td>220.62*</td>
<td>26</td>
<td>.87</td>
<td>.85</td>
<td>.81</td>
<td>.87</td>
<td>.89</td>
<td>.14</td>
</tr>
<tr>
<td>Final hypothesized two-factor model</td>
<td>75.12*</td>
<td>23</td>
<td>.96</td>
<td>.95</td>
<td>.94</td>
<td>.96</td>
<td>.96</td>
<td>.07</td>
</tr>
<tr>
<td>Unmodified competing one-factor model</td>
<td>348.53*</td>
<td>27</td>
<td>.78</td>
<td>.76</td>
<td>.70</td>
<td>.78</td>
<td>.82</td>
<td>.18</td>
</tr>
<tr>
<td>Final competing one-factor model</td>
<td>126.70*</td>
<td>24</td>
<td>.92</td>
<td>.91</td>
<td>.89</td>
<td>.92</td>
<td>.92</td>
<td>.11</td>
</tr>
</tbody>
</table>

Note: CFI = comparative fit index; NFI = Bentler-Bonett normed fit index; NNFI = Bentler-Bonett nonnormed fit index (also known as Tucker-Lewis Index); IFI = incremental fit index; GFI = goodness-of-fit index; RMSEA = root mean square error of approximation.

*p < .01.
participants’ ages ranged from 12 to 19 years ($M = 14.02$, $SD = 1.47$). Self-reported ethnic identification for the sample was as follows: Of the participants, 87.5% were Chinese, 6.3% were Indian, 4.9% were Malay, and 1.4% endorsed Other (all other ethnic groups not listed).

**Measures**

**AESI.** The same nine-item AESI with its two subscales (Expectations of Parents/Teachers and Expectations of Self) used in Study 2 was administered in Study 3.

**Revised Children’s Manifest Anxiety Scale (RCMAS).** The RCMAS (Reynolds & Richmond, 1985) is a 37-item self-report instrument for assessing the level and nature of anxiety in children and adolescents. The RCMAS provided five scores. The total anxiety score is based on 28 items, which are divided into three anxiety subscales: Physiological Anxiety (10 items), Worry/Oversensitivity (11 items), and Social Concerns/Concentration (7 items). The remaining 9 items constituted the Lie subscale. Responses to each of these items on the RCMAS were made using a yes-no format. A high score indicated a high level of anxiety or lie on that subscale. In this sample, the Cronbach’s alphas for the Total Anxiety score, Physiological Anxiety score, Worry/Oversensitivity score, and Social Concerns/Concentration score were .84, .63, .76, and .64, respectively. There are ample research studies documenting the validity of RCMAS scores (e.g., Reynolds, 1982; Stark & Laurent, 2001).

**Behavior Assessment System for Children–Self Report of Personality (BASC-SRP).** The BASC adolescent self-report form (Reynolds & Kamphaus, 1992) was used, and only the following two subscales were administered: Sensation Seeking (14 items), and Self-Reliance (7 items). Scores from the Sensation Seeking subscale (e.g., “I like it when my friends dare me to do something”) measures the tendency to take risks and to seek excitement. A high score indicates a preference for risk taking and experimentation. Scores from the Self-Reliance subscale (e.g., “I am someone you can rely on”) measures confidence in one’s ability to solve problems and a belief in one’s personal dependability and decisiveness. A high score represents positive personal adjustment in terms of being willing to take responsibility, to make decisions, and to face life’s challenges. Responses to each of these items on the BASC self-report subscales were made using a true-false format. The reliability estimates for the scores of these two subscales in the study were Sensation Seeking (.68) and Self-Reliance (.67). The BASC-SRP has been correlated with several established instruments providing documentation of the validity of BASC-SRP’s scores (e.g., Doyle, Ostrander, Skare, Crosby, & August, 1997; Sandoval & Echandia, 1994).

**Consent and Procedure**

The procedures used for obtaining consent, participation, and questionnaire administration were similar to those of Study 1 except that this sample of 144 partici-
Results

Test-Retest Reliability and Internal Consistency

The 2-week test-retest reliability coefficients for the scores on the nine-item AESI and the scores on Expectations of Parents/Teachers and Expectations of Self subscales were .85, .79, and .77, respectively. The coefficient alphas for the nine-item AESI, the Expectations of Parents/Teachers subscale, and the Expectations of Self subscale were as follows at Time 1: .83, .77, and .74, respectively. At Time 2, the coefficient alphas were .90, .86, and .84, respectively. Taken together, these reliability estimates appear adequate for research purposes (Henson, 2001; Nunnally & Bernstein, 1994).

Convergent and Discriminant Validity

We calculated correlations between the AESI scores and RCMAS scores (Reynolds & Richmond, 1985) to examine further evidence of AESI’s convergent validity. We expected academic stress to be moderately correlated with anxiety. As hypothesized, the results yielded positive correlations between AESI total and subscale scores and RCMAS total and subscale scores (see Table 4). Correlations ranged from .19 to .36, which represent medium effect sizes according to Cohen’s (1988) definition. Results indicated that participants who perceived greater academic stress from expectations of

Table 4

<table>
<thead>
<tr>
<th>Scale</th>
<th>1</th>
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<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>1. AESI</td>
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<td>2. AESI F1</td>
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<td>3. AESI F2</td>
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<td>.54</td>
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<td>4. RCMAS</td>
<td>.36</td>
<td>.31</td>
<td>.32</td>
<td>—</td>
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<tr>
<td>5. RCMAS-PH</td>
<td>.27</td>
<td>.22</td>
<td>.27</td>
<td>.80</td>
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<td>6. RCMAS-WO</td>
<td>.32</td>
<td>.27</td>
<td>.29</td>
<td>.90</td>
<td>.59</td>
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<td>7. RCMAS-CO</td>
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<td>.27</td>
<td>.19</td>
<td>.73</td>
<td>.36</td>
<td>.53</td>
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<td>8. BASC-SS</td>
<td>—.07</td>
<td>—.08</td>
<td>—.04</td>
<td>.20</td>
<td>.24</td>
<td>.13</td>
<td>.14</td>
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<tr>
<td>9. BASC-SR</td>
<td>.07</td>
<td>.05</td>
<td>.08</td>
<td>—.16</td>
<td>—.14</td>
<td>—.09</td>
<td>—.18</td>
<td>.09</td>
<td>—</td>
</tr>
</tbody>
</table>

Note: AESI = Academic Expectations Stress Inventory; AESI F1 = Factor 1—Expectations of Parents/Teachers; AESI F2 = Factor 2—Expectations of Self; RCMAS = Revised Children’s Manifest Anxiety Scale; RCMAS-PH = RCMAS Physiological Anxiety subscale; RCMAS-WO = RCMAS Worry/Oversensitivity subscale; RCMAS-CO = RCMAS Social Concerns/Concentration subscale; BASC-SS = Behavior Assessment System for Children Sensation Seeking subscale; BASC-SR = Behavior Assessment System for Children Self-Reliance subscale.

Pating students completed all the measures at Time 1 and completed only the AESI again 2 weeks later (Time 2).
self and others also experienced greater overall anxiety, physiological anxiety, worry/oversensitivity, and anxiety over social concerns.

We calculated correlations between the AESI scores and two of BASC-SRP’s (Reynolds & Kamphaus, 1992) subscale scores (Sensation Seeking and Self-Reliance) to examine the evidence of AESI’s discriminant validity. We expected academic stress to be uncorrelated with sensation seeking and self-reliance. As hypothesized, the results yielded a lack of meaningful correlation between the scores on all the AESI scales and both BASC-SRP’s subscales (see Table 4). Correlations ranged from –.08 to .08, which represent negligible effect sizes, indicating that scores from AESI and Sensation Seeking as well as scores from AESI and Self-Reliance are measuring distinct constructs.

Summary and General Discussion

The objective of this investigation was to construct and validate scores in a self-report inventory to measure expectations as a source of academic stress in middle and high school Asian students. The study used both theory and statistics to identify items leading to the establishment of the nine-item AESI, consisting of the five-item Expectations of Parents/Teachers and the four-item Expectations of Self subscales. Results across three studies suggest that AESI and its subscales provide reliable scores measuring academic stress arising from expectations of parents/teachers and expectations of self in middle and high school Asian adolescents. The obtained scores from the total scale and both factors were found to be internally consistent across the studies with Cronbach’s alphas ranging between .74 and .90. The 2-week test-retest reliability estimates for the total scale and subscale scores were satisfactory and ranged from .77 to .85.

The emergence of the two factors is consistent with the literature on expectations as a source of academic stress as experienced by Asians and Asian Americans. For example, in their recent study, Gloria and Ho (2003) noted that Asian Americans perceived family involvement and support as pressure to perform and to excel academically. Yeh and Huang (1996) argued that academic pressure due to expectations of parents, and to a lesser extent teachers, is particularly salient in Asian collectivistic cultures because not meeting these expectations would likely lead to feelings of shame, which often include exclusion or withdrawal of support. This type of exclusion is exceeding painful to the individual whose sense of self rests primarily on interdependence and group memberships (Triandis, 1989). Obtaining a good education and subsequently a good job provide the fuel for upward social mobility, and Asian children have been socialized to value hard work and diligence (D. Y. F. Ho, 1981). Sue and Okazaki (1990) argued that if Asian Americans perform well in education and consequently assume professional positions, they would then be more motivated to continue this pattern of mobility. Based on research, it is clear that Asian students find the need to excel academically a source of intense pressure and stress (K. C. Ho & Yip, 2003; Isralowitz & Ong, 1990; Juon et al., 1994; Lee & Larson, 2000). Hence, the two factors underlying
the AESI appear to accurately reflect Asian and Asian American students’ experiences of expectations as a source of academic stress.

In studying AESI’s scores for convergent and discriminant validity, we examined some of the hypothesized relationships between AESI and other measures. The positive correlations between the AESI scores and the FNE-Brief (Leary, 1983a), CDI-Short (Kovacs, 1992), and RCMAS (Reynolds & Richmond, 1985) scores provide initial evidence of AESI’s convergent validity. The null relationship between the AESI and the Sensation Seeking and Self-Reliance subscales of the BASC-SRP (Reynolds & Kamphaus, 1992) scores provide initial evidence of AESI’s discriminant validity.

This study has a few limitations. Because the AESI was deliberately restricted in its focus, it was not comprehensive in its coverage of academic stressors in the school environment. For example, it does not measure academic stress arising from peer factors such as teasing or taunting. Given that peer relationships involve important developmental issues during adolescence, this is a potentially important delimitation. Also, if researchers were interested in developing a more comprehensive measure of academic stress in Asian populations, it would be necessary to begin with a much broader item bank than was used in this study. Another limitation is the restricted age range of the participants. All participants in the studies were middle and high school Asian students. Future studies need to be conducted on other age groups of students, for example, upper elementary students and college students, to further validate the obtained scores from AESI.

Notwithstanding the need for additional research, it is hoped that the AESI will become a useful tool for researchers, especially those interested in understanding the role of expectations of parents/teachers and expectations of self as sources of academic stress among Asian student populations. For example, given the findings that Asians in Asia have higher levels of anxiety and depression than individuals from non-Asian countries (Sastry & Ross, 1998), and that Asian Americans have higher levels of distress and depression compared to White Americans (Abe & Zane, 1990; Okazaki, 1997), it would be interesting to examine the relationship between academic expectations (of parents/teachers and of self) and anxiety and depression in children and adolescents of Asian descent.

References


