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A Priori Model of Students’ Academic Achievement: The Effect of Gender as Moderator  

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Abstract  

Gender results differences in many aspects of human development. The purpose of this study is to test academic achievement among the students using gender as a moderator. This is an empirical research using structural equation modeling comprised of 493 students from eight secondary schools. Academic achievement is measured based on the students' performance in the Lower Secondary Assessment. Results demonstrated that model of male and model of female fit the data of this study adequately. Academic self-concept and socioeconomic status are predictors for academic achievement for both genders. Gender has been identified as a moderator of this study. The results also indicated that gender has moderated the effect of socioeconomic status on academic self-concept. The impact of socioeconomic status on academic self-concept is found to be greater for the female students than for male students.  

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Keyword: gender; academic achievement; academic self-concept; socioeconomic status; structural equation modeling
1. Introduction

Gender is a universal term which refers to male and female. Many differences can be found between male and female and one of them is in the aspect of academic achievement. Educational statistics and media have reported the gap in achievement between male students and female students (Wong et al., 2002; Tinklin, 2002; Clark et al., 2008; Rinn et al., 2008; Ismail, 2009; Gibb et al., 2008). Gender differences in academic achievement have long been a topic of discussion among psychologists, educators, and researchers. According to Feingold (1998), childhood training and experience, gender differences in attitudes, parental and teacher expectation and behaviors, biological differences between the sexes may all contribute to gender gap in achievement. Studies conducted by many researchers have shown conflicting patterns of results regarding differences caused by gender in academic achievement. The differences vary according to subjects, age, level of schooling, language, literacy, and others. On the other hand, there are findings revealing that the academic gap between boys and girls is narrower nowadays or no differences are found in the area of academic achievement based on gender.

Some literature reported that there are gaps in academic achievement based on gender. Dayoğlu and Aşık (2007) found a relationship between gender and academic achievement in a study sample of 10,434 graduates in Turkey. The findings indicated that there is academic gap between the male and the female graduates. Female graduates obtained higher CGPA than male graduates during the course although female graduates enrolled with lower grades. It shows that the academic gap still can be seen even at the tertiary level. Besides, female graduates were found to have higher literacy competency than male graduates. This is consistent with the findings of Tinklin (2003) which reported that more female secondary school students left school with better results than the male students.

According to Clark et al. (2008), at the lower and upper secondary school level, more female students obtained CGPA>3.0 but more male students received CGPA <2.0. Most of the students in the category of CGPA <1.0 are male and they are the risk group for dropout. However, no significant academic achievement gap was found between CGPA=2.0 and CGPA=3.0. This is agreed by Davis (2007) who reported that more female students than male students attain good grades in the elementary, secondary and upper secondary school level. Davis (2007) further explained that it might be attributed to the higher self-discipline among female students. The findings of Hunley et al. (2005) reveal that female students can get higher grade than male students based on their study using the sample of secondary school students. This may be due to the fact that female students spent more time on completing their homework. This is supported by Kyong et al. (2005) who found that female students hold higher academic ethical and better academic achievement in a study based on 675 graduates.

Incompatible findings on the relationship between gender and academic achievement were found in the literature. Chang (2008) conducted a study using the data of TIMSS (1999) and TIMSS (2003) in Taiwan. The results show that the gender gap in achievement in the Sciences was getting narrower through the years. More male students achieved higher grade in Science compared to female students. This is agreed by Arthur (2007) and Preckel et al. (2008) because their findings indicated that male students can obtain higher grades in Mathematics whereas female students are better in oral skills. However, contradicting reports were given by Rinn et al. (2008) because male students can perform better in Mathematics was not evidenced in their findings. Falaye (2006) concluded that academic achievement gap pertaining to gender exists based on subject.
Self-concept is the set of attributes, abilities, attitudes, and values that an individual believes define who he or she is (Berk, 2000). Self-concept is divided into academic self-concept and non-academic self-concept. Academic self-concept is defined as the individual’s assessment of his or her ability to learn in the school context in comparison to relevant others in the school (Brookover, 1959). The non-academic self-concept consists of social, physical, moral and ethic, personal, and family self. Research on gender differences in self-concept has produced inconsistent findings. Wilkins (2004) and Hasenzadeh et al. (2004) concluded that significant differences were found on self-concept based on gender. Dai (2001) reported that Chinese adolescent girls have higher verbal self-concept and boys possess higher Mathematics self-concept. A study conducted by Chang (2008) using the data of TIMSS 1999 and TIMSS 2003 in Taiwan reveals that male students have higher Science self-concept compared with female students. This is agreed by Park (2003) and Lai (1999) because their findings indicated that self-concept of male students was higher when they used adolescents and university students as their samples respectively. However, this is inconsistent with the findings of Cokley (2000), Marzuki (2002) and Chai (2006) who found no significant differences in self-concept based on gender. Findings of Mohd Najid and Salehudin (2007) provide input that no significant difference in self-concept based on gender was found except for family and moral self. Besides that, socioeconomic status also considered to be one of the best predictor for academic achievement (Coleman, 1966; Kahlenberg, 2006; Thomas & Stockton, 2003). Most of the findings reveal that high socioeconomic status is correlated with good academic achievement (Heng, 2000; Tiller et al., 2003; Yap, 2000; Tian, 2006: Soares & Collares, 2004). According to Croli (2004) this is due to fact that parents of high socioeconomic status can provide high level of encouragement, academic support at home (Song & Hattie, 1984; Heng, 2000), motivation and conducive learning environment (Soares & Collares, 2004).

The objective of this study is to test the full model of academic achievement empirically using the structural equation modeling (SEM) approach based on the data of male students and female students. It is hypothesized that the model fit the male and female data well. It is aimed at gaining in-depth understanding on the role of gender in determining the impacts of self-concept and socioeconomic status on academic achievement at the secondary school level. Besides that, the study is also intended to identify the role of gender as a moderator.

2. Methodology
Respondents for this study consisted of tenth grade 16-year-old students of public secondary schools in Malaysia. From the total number of 493 students, 218 were male and 275 were female. 399 of the respondents have achieved the level of competency which means they passed all the six subjects. There were 284 respondents from urban schools and 209 respondents from rural schools. Samples were selected from eight schools based on two-stage random sampling procedure. Tennessee Self-concept Scale (Fitts, 1965) was used to evaluate the aspect of non academic self-concept and Brookover Self-concept of Ability Scale (Brookover et al., 1964) was used for obtaining data on academic self-concept. Results of the Lower Secondary Assessment which comprised of English language, Malay Language, Mathematics, Science, Geography and History were used as the data for academic achievement. All the instruments used in the study were translated from English to Malay language and have been pilot-tested.

3. Result of Research
The reliability of all instruments used in the study was evaluated based on the estimates of internal consistency (Cronbach alpha). The cut-off point for Cronbach alpha is .70 and above (Hinton et al., 2004). Structural equation modeling (SEM) was applied to assess the fit of the full model of academic achievement built for this study. SEM was performed using AMOS 16 (Analysis of Moment Structure). As suggested by Kline (1998) at least three types of goodness-of-fit indices should be used in testing the goodness of fit of the model. In this study, four types of goodness-of-fit indices applied were Jörskog
Sorbom goodness of fit index (GFI), Bentler comparative fit index (CFI), Tucker-Lewis index (TLI) and Root mean-square error of approximation (RMSEA). As for GFI, CFI and TLI, the cut-off point for acceptable model fit is .90, with the values greater than .90 indicating adequate model fit whereas for RMSEA the value smaller than .06 is an indication of good fit (Bentler & Bonett, 1980; Hu & Bentler, 1999; Kline, 2005; Hair et al., 1998).

The role of gender as a moderator for this study is determined based on the full model of academic achievement. The model is constrained and unconstrained in order to obtain the differences in the chi-square value and degree of freedom. As Table 1 reveals, the $p$ value of .03 is less than .05 which indicates that significant differences were found between the male and the female models. Thus gender is a moderator for this study.

Table 1: Chi-square value and degrees of freedom for the constrained and unconstrained model

<table>
<thead>
<tr>
<th>Model</th>
<th>Chi square</th>
<th>Degrees of freedom</th>
<th>$\Delta$ Chi square</th>
<th>$\Delta$ Degree of freedom</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constrained</td>
<td>1030.930</td>
<td>686</td>
<td>13.86</td>
<td>6</td>
<td>.03</td>
</tr>
<tr>
<td>Unconstrained</td>
<td>1017.070</td>
<td>680</td>
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Figure 1 and Figure 2 represent the full model of academic achievement for male and female students respectively. As indicated in Figure 1 and Figure 2, both the models have achieved acceptable fit. The model of female students shows better fit [GFI=.882, CFI=.932, TLI=.925, RMSEA=.044] compared to the model of male students [GFI=.858, CFI=.903, TLI=.892, RMSEA=.052]. This implies that the model of female students fit the data of this study better than the model of male students.
model. Academic self-concept is the most important predictor for the academic achievement of the male and female students. The regression weight for ASC of the female students does not fall within the 95%CI of the male students. Thus, the role of gender as a moderator for SES is significant for the male students.

Table 2: Regression weights

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<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>95%CI*</th>
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<th>Estimate</th>
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(IN1-IN20, P1-P2, BSAA1-BSAA4, PDT and LU represent observed variables, e1-e66 represent error variances, NASC represents non-academic self-concept, ASC represents academic self-concept, AC represents academic achievement and SES represents socioeconomic status)

Table 2 reports the standard regression weight for both the male students’ model and female students’ model. The regression weight for NASC → AC for both models is not significant. Regression weight for ASC → AC and SES → AC shown significant value for the male students’ model and female students’ model. Academic self-concept is the most important predictor for the academic achievement of male and female students in this study. Socioeconomic status is the next important predictor for academic achievement of the male and female students. The regression weight for ASC → AC and SES → AC of the male students is slightly higher as compared to the female students. At the same time, as revealed in Table 4, the regression weight of SES → ASC which is 0.371 for the female students model does not fall in the 95%CI (confidence interval) of the SES → ASC [0.13, .359] of the male students’ model. The finding indicates that there is significant difference of SES → ASC between the male students’ model and the female students’ model. The regression weight of SES → ASC for the female students’ model is higher than that for the male students’ model. Thus, the role of gender as a moderator for SES → ASC in the study is confirmed.

Table 2: Regression weights

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<th>Parameter</th>
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<th>95%CI*</th>
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4. Discussion

The result of the study has provided input regarding the contributions of academic self-concept, non-academic self-concept and socioeconomic status on academic achievement among secondary school students. Further analysis shows that only academic self-concept and socioeconomic status can produce impact on the aspect of academic achievement for the male and female students of this study respectively as supported by the findings if Wondimu and Marjon (2006), Nasim et al. (2005), Yap (2000), Heng (2000), Tian (2006), Ruzina (2005), and Tiller (2003). Contrary to expectations, the effect of non-academic self-concept on academic achievement is not significant for the male students and the female students respectively. The most important predictor for academic achievement of the male and female students in this study is academic self-concept. This might be because most of the participants are of middle socioeconomic status and with average academic achievement. Hence, academic self-concept which will provide them with confidence to excel in the academic field is of importance to them. This finding further highlighted the significant role of academic self-concept in enhancing student academic achievement. Socioeconomic status is the next important factor influencing academic achievement of the male and female students in this study (Coleman, 1966; Kahlenberg, 2006; Thomas & Stockton, 2003). Socioeconomic status has an important role in academic achievement because it is needed to fulfill all the aspects in facilitating the learning process (Song & Hattie, 1984; Heng, 2000; Soares & Collares, 2004). In this study, academic self-concept produced greater impact on academic achievement for the male students as compared with the female students. This can be explained by the findings of Wilkins (2004) and Hasenzadeh et al. (2004) which show that differences in self-concept exist based on gender. However, the effect of socioeconomic status on academic achievement is almost the same for both genders. In this study the non-academic self-concept has resulted in non-significant impact on academic achievement for both genders; this might be because most of the participants belong to middle class families and they focus more on the academic achievement that can help them to improve the financial status of their families. Therefore, academic self-concept can influence them significantly.

Another vital point produced by this study is the role of gender as a moderator. It can be seen that gender can result in significant differences in the relationship between socioeconomic status and academic self-concept. The effect of socioeconomic status on academic self-concept is higher for female participants as compared to male participants. This finding evidenced the fact that gender resulted in disparity impacts in the formation of self-concept (Wilkins, 2004; Hasenzadeh et al., 2004; Chang, 2008). It is important that consideration to be given to the factors of academic self-concept and socioeconomic status in the process of enhancing academic achievement of both gender. Educators should apply strategies to instill positive academic self-concept among the students in their learning process as it can create confidence within them. Besides that, financial aid should be provided to the students of low...
socioeconomic status as financial shortcomings can jeopardize the learning process. Although non-academic self-concept is found to be not significant in this study, further study needs to be conducted in order to clarify this aspect.

References


