Student Engagement and Teacher-Student Relationship: The Influence of Noncognitive Factors on Educational Achievement

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Introduction

Prior study has shown the importance of noncognitive abilities which determine student's social and economic success (e.g. Bowles & Ginties, 1976; 2002; Farkas, 2003; Heckman, 2006; Rosenbaum, 2001). The pervasive view in the past literatures which accounted for cognitive ability, e.g. test scores, as the prevailing role in explaining the differences of personal achievements has been challenged (Heckman 2006:477-478). It is thus surprising that prior academic discussions of skill and skill formation almost exclusively focus on measures of cognitive ability and ignore noncognitive traits. Also, while a wealth of studies has examined the effects of social structure on achievement (e.g. school tracking, family background...), far less activity has centered on human agency- e.g. the engagement of a student in the learning process (Carbonaro, 2005). Previous researches has found there is a significant effect of student effort on their learning process (Sorensen & Hallinan, 1977; Marks, 2000; Johnson et al., 2001; Carborano, 2005; Kelly, 2008), which implies academic rewards are associated with student's actions within specific structure positions at school (Carborano 2005).

Additionally, research on student's effort as well as other kinds of noncognitive traits suggests the importance of considering teacher's perception on student's behaviors and attitudes (Farkas et al., 1990; Kelly, 2008; Lleras, 2008; Tach and Farkas, 2005). Using teacher's report to avoid the overestimate of student's self report on their effort is just one of the important considerations. On the other hand, it is probable that teacher's perceptions on student's noncognitive traits are not totally objective. These perceptions are often influenced by considering students' background as well as teachers' subjectivity (Farkas,

1990; Lamont & Lareau, 1988). Research also demonstrated the positive relationship between teacher's motivation and student's educational performance (Lleras, 2008). Therefore, this study put more focus on student's noncognitive behaviors or traits evaluated by teachers.

A massive array of studies have described family as one of the main sources in producing differential outcomes for children (Bowles and Ginties ,2002; Farkas, 2003; Guo and Harris, 2000). Researcher also explored which intermediate factors account for the indirect causality between family background and children's educational success (Guo & Harris, 2000). One of the possible explanations came from cultural capital perspective which stresses families with different classes have different type of child-caring strategies (Farkas, 2003; Swidler, 1986). This paper examine whether these noncognitive factors intermediate between parent socioeconomic status and student achievement.

The first goal of this study is to examine how student noncognitive traits contribute to gaining a better understanding of differences among student's academic achievement when controlling for other structural and cognitive factors. We consider three dimensions to explore the impact of noncognitive behaviors: student effort represents student engagement, student-teacher closeness measures the interconnectivity between students and their teacher which emphasizes on student attachment to school and teacher's influence, and student positiveness measures the impact of psychological traits.

The second goal of this study is to examine student noncognitive traits as important mediating factors for effects of parental socioeconomic status. Student noncognitive behaviors and habits tends to be correlated with family background from a cultural capital perspective that parents from different classes use various educational as well as child care strategies. We hope this could help us better understand the mechanisms of family background on educational success as well as why noncognitive traits are associated with academic achievements.

Engagement as One of the Important Noncognitive Traits which Influence on School Success

A wealth of studies has underscored student engagement as one of the most non-ignorable traits of noncognition which account for the variance in academic achievement (Carbonaro, 2005; Farkas et al., 1990; Johnson et al., 2001; Kelly, 2008). In a broad perspective, engagement refers to the way of how students participate in school matters, including working hard, participating in discussions, being attentive in class,

finishing homework, attending class, avoiding distracting behavior, taking part in extracurricular activities, and so on (Johnson et al., 2001). According to Gamoran and Nystrand (1992), engagement can be divided into two forms: procedural engagement and substantive engagement. The former one includes the effort which is followed by teacher's instruction and often seems routine so that students does not have to think critically. In contrast, the latter one much deals with critical thinking and a genuine personal interest in searching for some extraordinary achievement in class.

Therefore, engagement might refer a series of noncognitive behaviors which reflect the degree of students' interest in participating in school's work as well as pursuing grade performance. It has often been found that effort and participation in class are important predictors of student performance (Carbonaro, 2005; Lleras, 2008; Johnson et al., 2001). This is especially true when considering how teachers assign grades evaluated by student's endeavor (Farkas et al., 1990; Kelly, 2008; Roscigno & Ainsworth-Darnell, 1999; Rosenbaum, 2001). Carbonaro (2005) found that differences in effort largely explain track differences for middle school students. Studies by Kelly (2008) also emphasized the influence student's effect, but demonstrated that only substantive engagement which relates to high-level thinking or authentic uptake has an impact on class grades.

Engagement, on one side, can be viewed as a series of behaviors in respond to students' attitude or eagerness toward pursuing performance at school. On the other side, student's characteristics as well as psychological traits can also be regarded as one of the important noncognitive attributes which relate to educational results. Farkas (2003: 544) reviewed studies and concluded a series of noncognitive habits which might be more influential than other ones when considering the process in determining socioeconomic success. Most of the effect of these noncognitive behaviors and traits might be well explained by economist perspective. A wealth of studies (e.g. Bowles and Ginties, 1976; Bowles and Ginties, 2002; Heckman et al, 2006; Rosenbaum, 2001) demonstrated the effect of noncognitive behaviors which are no less important than cognitive traits (e.g. IQ). According to correspondence principle (Bowles and Ginties, 2002), schools influence which cultural models children should exposed to in order to assure them to fit into the work world. In other words, schools assimilate student's behaviors at school to worker's performance in the workplace. The argument is that the noncognitive traits rewarded by employers are much the same ones that are rewarded by teachers.

There has been a lot of evidence to support the importance of noncognitive traits by using different measurements. For example: Heckman et al. (2006) used two indicators-

locus of control and self esteem- to demonstrate their effect on economic or school success. Rosenbaum (2001:186) found that school related behaviors (attendance, discipline, and leadership) are strongly associated with class grades, educational attainment as well as later earning. Dunifon and Duncan's (1998) research implicates the influence of incentive-enhancing preferences- preference for challenge over affiliation, fear of failure, and degree of trust. Also, the personal efficacy, measured by Rotter scale, can also be viewed as another important trait (Bowles and Ginties, 2002).

The Influence of Teacher

It is thus needless to emphasize the importance of noncognition which accounts to the influence on school's performance. Nevertheless, the information of student effort and other noncognitive related indicators used by most of the past research were answered by teacher (Farkas et al., 1990; Kelly, 2008; Lleras, 2008; Tach and Farkas, 2005). It is likely that teachers' subjectivity would influence their viewpoints about students' engagement as well as influence student school grades. Teachers evaluate each student's effort, and reward students for being active participants in class in order to keep instruction moving and promote a widespread growth in academic-related achievement (Kelly, 2008). Studies also found that if students are judged to be more motivated by their teachers and if they get along well with other persons in class, they will have higher probability to complete more education and get higher earnings in later lives (Lleras, 2008).

According to the cultural resource/ social interaction model, school reward outcomes heavily rely on teacher's judgments of both student cognitive and noncognitive performances (Farkas, 1990). It emphasizes the influence of teacher's bias which is operated by multiple feedbacks between teacher and student over a long time. Also, teacher might play the role as gatekeepers to restrain or promote individual's opportunity to get in high status positions (Lamont & Lareau, 1988). This model will also be strongly supported if teacher's judgment of student's behaviors could explain the differential school success of gender, poverty, and ethnic group (Farkas, 1990; Roscigno & Ainsworth-Darnell, 1999). In short, the key influence of teachers on their students might be implemented through two possible ways: teacher's subjective perception toward student behaviors as well as their "virtual" effect on student efforts.

If this is the case, then teacher-student closeness might need considering because teacher's opinion toward students may influence how students perceive themselves. School attachment and school commitment indicate how students feel themselves as a

member embedded in school (Johnson et al., 2001). As students feel a strong sense of attachment to school and have higher will to accomplish request (e.g. homework, discipline) asked by teachers, they will have better academic achievement (Stewart, 2007). Moreover, it is likely to view teacher-student closeness as a kind of resource that those with better relationship with teachers might get more assistance from teachers. For instance, studies demonstrated that teachers often play an important role to help high school students in the labor market by recommending them to employers (Rosenbaum , 2001:236-237).

Reexamining the Influence of Family: Noncognitive Traits as Mediating Factors

Although research on students' noncognitive traits has yielded interesting insights, there is not enough attention to explain what causes the variance in student's noncognitive related dispositions. In other words, further question need to be clarified in order to explain the whole mechanism between students' noncognitive traits and academic achievement. Guo and Harris (2000) explored a series of intermediate mechanisms (e.g. including physical environment as well as cognitive stimulation at home, mother's involvement with child…) which can be better explained how family poverty influence children's intellectual development. Referring the status attainment model, educational aspiration is an essential factor which mediates the effects of family background on educational outcomes (Sewell, Haller, and Portes 1969; Sewell and Shah 1968). Lieras's (2008) study found that among respondents with higher socioeconomic background, noncognitive behaviors explain about one-fourth of the educational advantage.

Therefore, family is one of the main sources in producing differential outcomes for children, because children from different family backgrounds receive distinct child-raising strategies from parents (Bowles and Ginties, 2002; Farkas, 2003; Guo and Harris, 2000). Farkas (2003) reviewed different theoretical approaches to explain the effect of family: From the human capital theory, parents with higher socioeconomic status invest more financial resources to help children get better achievement at school (Bowles and Ginties, 2002; Heckman et al., 2006). From the cultural capital perspective, parents from different classes transmitted different kinds of living styles and habitus to their next generation (Bourdieu, 1977). Low-income parents are often unable to help their children obtain better attainment for lacking the "key" skills or habits which are relevant to school success, whereas some skills and habits owned by high-income family can be signaled as high cultural status to catch teacher's attention even if they are of little productive in reality

(Swidler, 1986).

Hypothesis

Farkas (2003:544) mentioned that the noncognitive traits have both exogenous (innate) and endogenous (developed over time) aspects. It is possible that these skills and behaviors result from students' interaction with parents and teachers. This research focus on students in junior high school, we first hypothesize that parents socioeconomic status is positive correlated with student's noncognitive traits, including engagement (effort), teacher-student relationship, and their positiveness. Secondly, we hypothesize that these noncognitive traits are positive correlated with their test scores.

Research Data

The data are from Taiwan Youth Project (TYP), an ongoing panel study conducted at the Institute of Sociology, Academia Sinica, Taiwan. The project was started in year 2000, and has conducted 9 waves of interviews since then. The original respondents of this project include 2,696 7th graders (1st grade of the junior high) and 2,890 9th graders (3rd grade of the junior high) as well as one of their parents and their designated teacher of the class. These students were sampled from junior high schools located in the northern part of Taiwan in the year of 2000, including Taipei City, Taipei County, and Yi-Lan County. As Taipei is the largest metropolitan City in Taiwan, the economic activities in Yi-Lan are mostly agriculture-based, and Taipei County is in-between these two regions, the sample covers various levels of urbanization and economic structure. This panel study is designed to follow adolescent samples from early teenagers into young adulthood. In short, the goal of the research design is to cover various aspects of the interplay among family, school and community, which shape adolescents' future development.[1]

The study examined the Wave 3 and Wave 4 sample of adolescents who attend the 1st grade of the junior high at Wave 1. It also drew information from two supplemental TYP data sets: the Parent Data Set (for information from the parents of the Wave 3 adolescents), and the Designed teacher Data Set (for information from the designed teacher of the Wave 3 students). After we deleted missing data listwise, the final sample size of this study contained 1309 male students and 1251 female students from 40 sample schools.

[1] For more information, please visit TYP's official website: http://www.typ.sinica.edu.tw/E/

Analytic Strategy

This study focuses on three different types of student's noncognitive traits as latent factors, which include student positiveness, teacher-student closeness, and student effort. We employed confirmatory factor analysis to construct these latent factors. The confirmatory factor analysis is specified as part of the structural equation models. The second-order factor analysis is used to construct student positiveness. This second-order factor includes three first-order factors: relationship, personality, and talent. Each first-order factor has more than two indicators, and the cronbach's alpha which is used to test the reliability for each latent factor is over than 0.80. All of these indicators (with the total of 12 observed variables) came from the same set of questions in questionnaire which asked teachers to respond how each student in class fit the following characters. The confirmatory factor analysis is also applied to the rest of the other two noncognitive factors: teacher-student closeness and student effort. Teacher-student closeness includes 7 indicators, and student effort with 3 indicators. The reliability for both these two latent factors is high (the cronbach's alpha is more than 0.85).

We used structural equation model for the analysis to examine the relationship among different factors. Maximum likelihood with robust standard errors is used for estimation. Figure 1 presents the essential features of a structural equation model for the mediating mechanisms of the effects of parent's socioeconomic status on student's academic achievement. The dependent variable is student's Basic Competence Test (BC Test) for junior high school students（國中基測）. It is a continuous variable, which ranges from 0 to 300. The BC Test scores is determinant to student's educational career when they graduate from junior high school. Students with higher BC Test scores are more likely to enter academic-based, competitive senior high school instead of other choices, such as vocational school. Due to the Taiwanese educational policy, each BC Test taker has the chance to participate in this exam for second time if he/she is not satisfied with the grades taken for the first time. The TYP data set collected the first time of student's BC Test scores in wave 3 by asking the teachers to fill in each respondent's grades in their class. The second time of student's BC Test scores was collected in wave 4 when most of the respondents have been graduated from junior high school. Since a lot of respondents have taken this examination for two times, we used the higher scores to represent their academic performance.

(Figure 1 is about here)

Our approach is mainly characterized by the inclusion of the variables mediating between parent socioeconomic status and student's BC Test scores. The mediating factors include student's noncognitive traits and cognitive traits. In order to compare the effect of noncognitive traits, we used student's class ranking as a proxy for measuring adolescent cognitive performance during the junior's stage. Class ranking is recoded as a continuous variable in order to simplify the model and results. The exogenous variables include parent education (in years) and family income (log). Since father's education and mother's education may be not the same, we used the higher one to represent parent education. The following variables are also controlled in the model: student's gender and location (Taipei city, Taipei county, and Yi-lan county). If the information of parent education and family income is missing from parental data set but replaced by children's response instead, dummy variables "who answers the question" are created to control the measurement error (1=children, 0=parent). In the structural equation model, we allowed the noncognitive latent factors to have correlational relationships (see the bidirectional arrow in Figure 1).

Results

Table 1 presents the means and standard deviations for the key variables used in our analysis. The items used for measuring three latent noncognitive factors are also included in this table. For these items, the higher the score, the more the teacher thought that student fits the description. If the effect of noncognitive traits on academic performance is significant, we expect the correlations are in a positive direction. The correlations between class ranking and parent SES as well as school performance are expected to be negative, in which the student who gets the highest grades on average in class will be ranked 1st.

(Table 1 is about here)

Table 2 presents the parameter estimates of the structural equation model of BC Test Scores. To reduce the length of the table, we present the measurement model in Table 3. Table 2 includes mediating effect, direct effect, and indirect effect between variables. The baseline model indicates the impact of parent education, family income, class ranking and other control variables. In other words, the effects of noncognitive traits are totally ignored in this model. This analysis is nearly analogous to conventional OLS regression with the exception that it concerns the mediating effect of cognitive performance (class ranking) from parent SES to BC Test scores. Measures of overall fit demonstrate that the structural model fits the data fairly well. The model chi-square statistic is 2839 (df=15, $p<.001$).

While a model is considered to fit well if chi-square test fails to reject the null hypothesis, the value of Root Mean Square Error of Approximation (RMSEA) is 0.058, and the Comparative Fit Index (CFI) is 0.985. The value of RMSEA ranged between 0.05 and 0.08 indicates the overall fit of the model is not too worse. Also, CFI coefficient which values are greater than 0.9 implies the best fit.

(Table 2 is about here)

(Table 3 is about here)

According to the baseline model, parent education has a significant negative effect of class ranking. Also, class ranking as a mediating factors exert a highly significant and expected effect on BC Test scores. However, family income only directly affects BC Test scores. There is no indirect effect between family income and BC Test scores when taking class ranking as mediating variable into account. In contrast to students who live in Taipei city, students who live in the outskirt of Taipei city or Yi-lan country have lower BC Test grades. No gender difference can be found in the baseline model.

The full model in Table 2 is different from the baseline model that it allows for the mediating effects of noncognitive latent factors. Measures of overall fit show that the full model does not fit the data so well as the baseline model does. The model chi-square statistic is 40029 ($df=444$, $p<.001$). The RMSEA is 0.094, and the CFI is 0.772. The value of RMSEA ranged between 0.08 and 0.1 indicates the overall fit of the model is medium.

Looking up the effect of control variables, there is a gender difference when holding noncognitive factors into constant. It demonstrate that male tend to get higher BS Test scores than females. Besides, the negative effect of living outside Taipei city tends to slightly increase in contrast to baseline model. The effect of parent education on student positiveness or student effort is positive and expected. It shows that students whose parents have higher educational status tend to perceive more positive and they are more industrious. The association between parent education and teacher-student closeness is not significant. We also find less significant effects of family income on student's noncognitive traits except that its influence on student positiveness is significant. The effects of the three noncognitive latent factors on BC Test scores are significant. However, the effects of student positiveness and teacher-student closeness are negative. These results are on the contrary to our hypothesis and even contradict to our common sense.

The magnitudes of the coefficients in Table 2 also can be interpreted through

standardized coefficients. Looking up the effects of noncognitive factors on BC Test scores, the results suggest that student effort is the most influential of all the three noncognitive latent variables. The magnitude of student effort on BC Test scores is nearly the same as the magnitude of class ranking. When looking up the total indirect effects, it can be found that the magnitude of student effort as mediating variable between parent education and BC Test scores is the same as the magnitude of class ranking as mediating variable (both the Standardized coefficients are 0.11). These findings demonstrate the importance of student effort, which plays as important as cognitive ability when considering the effects of BC Test scores. Table 2 also demonstrate that family income only exerts direct effect on BC Test scores, no significant indirect effects can be found according to the results.

Discussions

This study explores how students' noncognitive traits are associated with their academic success. We argue that students' noncognitive traits are as important as their cognitive ability in stratification process. The measurement of noncognitive traits in this study is divided into three latent factors: student effort which represents their school engagement, student-teacher closeness measures school attachment as well as teacher's impact, and student positiveness measures the influence of some personal, psychological characters. Though a massive array of studies have described the importance of noncognitive behaviors or attitudes in stratification process, a much smaller number of studies have focused on the mechanisms of what accounts to the variance of noncognitive traits. In this paper we attempt to fill this void. In this research, the impacts of both noncognitive and cognitive traits are viewed as mediating between parent socioeconomic status and school success.

We offer two main findings: First, student's noncognitive traits are one of the most important factors which determine school achievement. Our research model indicates that student effort is by far the most important factors of noncognitive traits. The magnitude of this coefficient is as important as cognitive ability. Second, results also demonstrate student effort as a contributive mechanism which mediates between parent education and children's achievement in school. The finding implies that parents with different educational status might diffuse different beliefs and opinions toward their children. Children with higher education parents tend to engage with school activities more actively in order to satisfy their parents' will. Another possible explanation is that students who

exert more effort at school would gain positive response by teachers. Moreover, our study finds that only direct effect exists between family income and educational attainment. In other words, there is no mediating effect of income on school success.

However, out study demonstrates the negative relationship between student positiveness and educational achievement. The negative relationship can also be found between teacher-student closeness and educational achievement. These findings are contradict to our prior hypothesis. The tentative explanation is: students with better school performances and less behavior problems tend to have less need for keeping close relationship with their teachers. In contrast, teachers often spend more attention on those who perform worse than others or face some problems. Further attention needs to be given for accounting this phenomenon.

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Table 1. Descriptive Results for the Key Variables

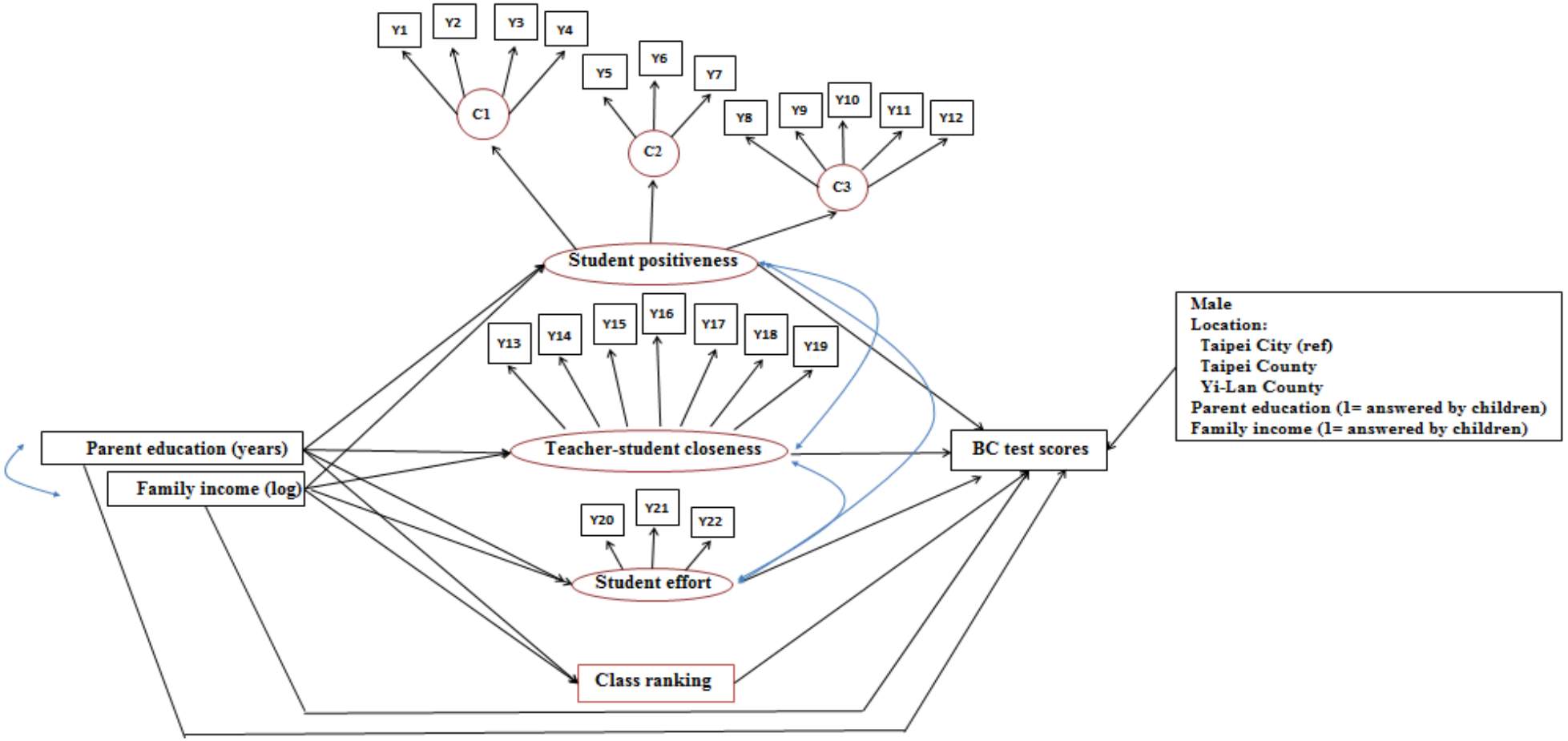
N= 2560	Mean	SD	Min	Max
BC Test Scores	156.27	59.68	0	300
Male	0.51		0	1
Taipei County	0.39		0	1
Yi-lan County	0.23		0	1
Parent Education	11.51	3.14	0	20
Parent Education (% answered by children)	0.25		0	1
Family Income (log)	10.71	1.17	0	13.71
Family Income (% answered by children)	0.28		0	1
Class Ranking	17.67	10.27	3	35
Do you think it's suitable to use the following characteristics to describe this student?				
Y1 He/she is kind and friendly to others	3.12	0.66	1	4
Y2 He/she likes to help others	3.00	0.70	1	4
Y3 He/she is enthusiastic about class activities	2.87	0.79	1	4
Y4 He/she has leadership ability	2.43	0.81	1	4
Y5 He/she is optimistic	2.99	0.71	1	4
Y6 He/she has high self-esteem	2.70	0.76	1	4
Y7 He/she has a good sense of humor	2.76	0.71	1	4
Y8 He/she is talented in athletics	2.42	0.91	1	4
Y9 He/she is talented in the arts	2.23	0.80	1	4
Y10 He/she is talented in writing and speaking	2.15	0.77	1	4
Y11 He/she is talented in music	2.17	0.75	1	4
Y12 He/she has scientific talents	2.11	0.75	1	4
How's your relationship with this student?				
Y13 He/she is very close to me	2.78	0.70	1	4
Y14 He/she tells me things in his/her family	2.57	0.74	1	4
Y15 He/she discusses school-related problems with me	2.57	0.79	1	4
Y16 He/she discusses emotional problems with me	2.47	0.76	1	4
Y17 I understand his/her family conditions	2.94	0.63	1	4
Y18 I understand his/her idea	2.87	0.63	1	4
Y19 I like him/her	3.08	0.67	1	4
Compare with students of the same age,				
Y20 How is his/her effort of academic learning?	4.16	1.73	1	7
Y21 How is his/her overall behavioral performance in school?	4.99	1.42	1	7
Y22 How is his/her learning abilities?	4.54	1.57	1	7

Table 2. Parameter Estimates of the Structural Equation Model of BC Test Scores

	Baseline Model			Full Model		
Independent Variables → Dependent Variables	Unstanardized Coefficient	Coef./S.E.	StdYX	Unstanardized Coefficient	Coef./S.E.	StdYX
Mediating Effects:						
Parent Education → Student Positiveness				0.013	4.27	0.10
Parent Education → Teacher-Student Closeness				0.003	0.84	0.02
Parent Education → Student Effort				0.113	10.49	0.22
Parent Education → Class Ranking	-0.69	-10.48	-0.21	-0.69	-10.48	-0.21
Family Income → Student Positiveness				0.021	2.58	0.06
Family Income → Teacher-Student Closeness				-0.004	-0.39	-0.01
Family Income → Student Effort				0.039	1.36	0.03
Family Income → Class Ranking	-0.18	-1.03	-0.02	-0.18	-1.03	-0.02
Student Positiveness → BC Test Scores				-8.365	-2.10	-0.06
Teacher-Student Closeness → BC Test Scores				-4.636	-2.42	-0.05
Student Effort → BC Test Scores				15.88	21.54	0.47
Class Ranking → BC Test Scores	-4.04	-57.82	-0.69	-2.60	-40.05	-0.50
Direct Effects:						
Parent Education → BC Test Scores	4.60	18.69	0.24	3.84	16.14	0.23
Family Income (ln) → BC Test Scores	1.95	3.13	0.04	1.68	2.85	0.04
Male → BC Test Scores	-0.09	-0.07	0.00	4.80	3.69	0.05
Taipei County → BC Test Scores	-5.89	-3.58	-0.05	-8.40	-5.50	-0.08
Yi-Lan County → BC Test Scores	-13.24	-6.74	-0.09	-14.73	-8.07	-0.12
Parent Education (1=Children Responded) → BC Test Scores	-4.03	-1.03	-0.03	-2.15	-0.60	-0.02
Family Income (1=Children Responded) → BC Test Scores	0.85	0.23	0.01	0.01	0.00	0.00
Total Indirect Effects:						
Parent Education → Student Positiveness → BC Test Scores				-0.107	-1.89	-0.01
Parent Education → Teacher-Student Closeness → BC Test Scores				-0.015	-0.79	0.00
Parent Education → Student Effort → BC Test Scores				1.788	9.49	0.11
Parent Education → Class Ranking → BC Test Scores	2.78	10.31	0.15	1.79	10.14	0.11
Sum of Indirect Effect from Parent Education to BC Test Scores	2.78	10.31	0.15	3.45	14.36	0.20
Family Income → Student Positiveness → BC Test Scores				-0.174	-1.63	0.00
Family Income → Teacher-Student Closeness → BC Test Scores				0.019	0.39	0.00
Family Income → Student Effort → BC Test Scores				0.62	1.36	0.01
Family Income → Class Ranking → BC Test Scores	0.73	1.03	0.01	0.47	1.03	0.01
Sum of Indirect Effect from Family Income to BC Test Scores	0.73	1.03	0.01	0.93	1.51	0.02

Table 3. The Measurement Model of the Structural Equation Model Presented in Table 2

		Baseline Model		Full Model		
Independent Variables	→ Dependent Variables	Unstanardized Coef./S.E. Coefficient	StdYX	Unstanardized Coefficient	Coef./S.E.	StdYX
Relationship	→ Y1			1		0.73
Relationship	→ Y2			1.271	42.19	0.87
Relationship	→ Y3			1.419	41.78	0.86
Relationship	→ Y4			1.05	30.21	0.62
Personality	→ Y5			1		0.75
Personality	→ Y6			1.132	35.27	0.79
Personality	→ Y7			0.987	33.70	0.74
Talent	→ Y8			1		0.44
Talent	→ Y9			1.486	20.86	0.74
Talent	→ Y10			1.645	21.66	0.85
Talent	→ Y11			1.461	21.14	0.77
Talent	→ Y12			1.251	20.06	0.67
Student Positiveness	→ Relationship			1		0.82
Student Positiveness	→ Personality			1.018	24.04	0.76
Student Positiveness	→ Talent			0.603	16.29	0.60
Teacher-Student Closeness	→ Y13			1		0.83
Teacher-Student Closeness	→ Y14			0.995	45.46	0.79
Teacher-Student Closeness	→ Y15			1.048	44.77	0.78
Teacher-Student Closeness	→ Y16			1.056	47.28	0.81
Teacher-Student Closeness	→ Y17			0.576	27.64	0.53
Teacher-Student Closeness	→ Y18			0.773	39.71	0.71
Teacher-Student Closeness	→ Y19			0.708	33.26	0.62
Student Effort	→ Y20			1		0.91
Student Effort	→ Y21			0.693	46.72	0.77
Student Effort	→ Y22			0.77	47.39	0.78



C1 Relationship

Y1 (2)待人親切友善
Y2 (3)喜歡助人
Y3 (4)熱心班級事務
Y4 (5)有領導能力

C2 Personality

Y5 (6)樂觀
Y6 (7)有自信
Y7 (8)有幽默感

C3 Talent

Y8 (11)具有運動、舞蹈方面的天份
Y9 (12)具有美術書法方面的天份
Y10 (13)具有作文、演講方面的天份
Y11 (14)具有音樂方面的天份
Y12 (15)具有科學方面的天份
Y13 (1)他和我很親近
Y14 (2)他會和我說他家裡的事
Y15 (3)他有課業上的問題會找我談
Y16 (4)他有情緒上或交友上的煩惱會找我談
Y17 (5)我瞭解他的家庭狀況
Y18 (6)我瞭解他的想法
Y19 (7)我喜歡他
Y20 10a.他對課業學習的努力程度
Y21 10b.他在學校的整體行爲表
Y22 10c.他對課業的學習能力

Figure 1. Eessential Features of a Structural Equation Model for the Mediating Mechanisms of the Effects of Parent's Socioeconomic Status on Student's BC Test Scores.