Contextual Effect of Adolescents' School Achievement: Family, School, and Community Influences

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Abstract

This study explores the contextual effect of adolescents' school achievement by examining the effect of family, school, and community on achievements both in the Basic Competence Test for senior high school and in the General Scholastic Ability Test for college or university. Using data from wave 1 to wave 7 of Taiwan Youth Project, the authors examine the impact of context variables regarding adolescents' study environment on academic performances of two important exam events in adolescents' life. The findings reveal that the prior school achievement strongly determines the attainment or outcome of education in the later education stages. And, the contexts of adolescents do show strongly influence on the school achievement and its growth either in the junior high or in the senior high period.

INTRODUCTION

In recent decades, an increasing number of researchers have begun studying the role of study environment in a broad sense, including family, school, and community, in affecting adolescents' academic performance. The growing research on this topic points to the role of the family as educational resources provider and school as inequality reducer or enhancer, as well as to the role of community as a social agent. Any body of these literature operate under the premise that the resources, competition, and cultural capital strongly affect students' academic achievements, particularly in the performance in the examination by which whether a student is able to continue the further education and what kind school she or he can attend are determined. More specifically, researchers have suggested that simultaneously considering the context of family, school, and community on student learning is likely to provide educational sociologists with better opportunities to clarify the true influences of study environment on students' achievements, and, indeed, to strengthen educational strategies.

Whereas the impact of individual characteristics on students' school achievements is widely studied, little research has further investigated the integrated ways that include family, school, and community characteristics at the same time as shedding light on the effect of context on educational outcomes. To accomplish this purpose, we seek in this article to examine systematically and sequentially the impact of adolescents' study contexts on their educational achievements from junior high period to senior high, and further from junior high period to college.

We argue that the family resources contribute to student's general ability, school competition promotes the student's academic outcomes, and that community's cultural capital enhances the student's performance in the competitive exam(DiMaggio 1982;Dumais 2002). In other words, not only does this study consider three types of

study contexts of adolescents in shaping their academic outcomes, but it also scrutinizes the dynamics of academic outcomes that evidences how study contexts in the previous period influence achievements in the later life period. As such, four research questions are addressed in this study: (1) how does adolescent's academic achievement develop during junior high period and in what path? (2) In what context does the trajectory of adolescent's academic achievement in junior high period affect the performance in Basic Competence Test (BCT) which further leads to the choice of the track of high school? (3) Whether will the academic achievement in BCT continue to influence the achievement in the General Scholastic Ability Test (GSAT) with which different universities or colleges are decided? (4) What roles do study contexts of adolescents, including family, school, and community characteristics, play in affecting the relationship between academic performance in the earlier stage and academic achievement in the later stage in adolescent's educational process?

In what follows we first develop the theoretical rationale in which our arguments are embodied. Next, we examine our theoretical expectations with data of TYP, and, finally, we discuss the findings in light of sociological theories on adolescent's academic achievement and context effect on their academic performance. By doing so, we will be in a position to better understanding the impacts of study contexts adolescents involved on their educational attainment in the life course.

THEORETICAL CONSIDERATION

Family environment is the most original context to rear the children and the influence is the most important and deep. In the past, the social scientists have recognized the important of an individual's family socioeconomic status (SES) as an influence on the academic achievement of children and adolescents. Higher family

SES has the better school performance. Through this, higher social class maintains their advantages over time. The congenital inequality seems not to be changed. This question is the basic sociological thinking. There were many researches concerning about this issue of inequality and social class reproduction, and recent researchers extending the concern from family SES to the school and neighborhood contexts. The explanation of social inequality has been extended from the factor of individual level to the factor of collective level such as school context and community context. The school context includes the peer groups, school class, the quality of teachers and the composition of school population (Alexander et al. 1979;Allison 2001;Allison and Patrick 2001;Dar and Resh 1986;Iver 1987;Opdenakker and Damme 2001;Toby and Dufur 2001); and the neighborhood context includes the characteristics of the inhabitation areas and community (Ainsworth 2002;Bell 2003;Brooks-Gunn et al. 1993).

For inequality, the extended thinking tries to find the broad way to resolve and explain why and how the inequality will happen and be shaped by the people's life(Hauser 1994;Hauser and Sewell 1986;Smith and Graham 1995). Prior research always concerned about two of the influence of family, school, and community on the school achievement, neglecting the influences of the third context embedded in the social life at the same time. It is hard to separate the influences very clear. Whether and to what extent contexts are simultaneously related to achievement is still not clear.

Moreover, the influence of context or environment on achievement is a long term standing, and it continuously shapes the individual's outcome in terms of achievement, behavior, attitude, and value very slow, deep and imperceptive. Thus, when we aim to figure out the influence of contexts on achievement, the 'time' is quite an important operator. Through the process of time, the context or environment shapes one's outcomes specifically, such as school achievement, behavior problems,

emotional adjustment and the job finding. Consequently, in our research perspective, we are curious about the issue of how the development of school achievement is influenced by three contexts simultaneously embedding in adolescents' life from the junior high period to the senior high period. In order to purify the influential effect of each of three contexts on adolescent's achievement when controlling for the effect of other two contexts, this study utilizes the seven-wave panel data to examine the effect of three types of study contexts on school academic achievement so that it allows us to take changes across time into account.

Coleman Report (1966) had claimed that the order of importance of factors affecting achievement is the facilities and curriculum first, the teacher quality the second, and the last is the family background and aspiration. He has also argued that inequalities in outcome are resulted from the differential family resources that individual students bring to school (Coleman 1990). In other words, many factors might contribute to the difference in the development of adolescents' achievement and those factors might be interweaving all together so that the isolated influential effect of contexts on achievement is hardly to be identified.

Coleman also used the 'Social Capital' to interpret the influence of family (Coleman 1990, 1988). The family resource or social capital imply two forms of influence: One is from the parental financial capital such as the family income, and other is from human capital such as the parental years of schooling. Indeed, both forms of family resources are suggested to play a substantially important role in shaping individual achievement, either in school or out school, or in education or in job.

Moreover, the adolescents' home environments reflect parental investment in child well-being and the educational expenditure. These environments are a function of material resources, such as the learning after the school, the learning in summer

vocation(Alexander, Entwisle and Olson 2001;Entwisle and Alexander 1992, 1994). The family educational investment is expected to influence the adolescents' school performance, even to the occupation in the future.

With the development of adolescents, the importance of family environment to a child decreases over time and the school environment gradually plays the dominate role to shape the development of adolescents' achievement(Entwisle and Alexander 1993, 1995). But how school environment influences the achievement development is still not quite clear. There have been some research found that the influence of mean parental education level of one's classmates had an independent positive effect on student achievement

With the development of adolescents, the importance of family environment decreases over time and the school environment gradually plays the main role to shape the development of adolescents' achievement. But how school environment influence the achievement development(Alexander et al. 1979;Caldas 1997;McDill and Coleman 1963). In other words, if a student from a home that is strongly and effectively supportive of education is put in a school class where most classmates do not come from such homes, his achievement will be little different than if he were in a school class composed of other like himself.

In addition, the competition climate in class will change the adolescents' motivation and effort in learning (Dar and Resh 1986;Veldman and Sanford 1984). There are some factors to produce the competition climate such as class size, the management strategy of teacher, the ability level of school class and the expectation of achievement of classmates. Higher class competition may drive voluntarily or forcefully the adolescents to put much time in study, get more knowledge or training from outside school, and participate in the cram school after school, etc.

However, outside the school environment, the adolescents' achievement

development may be affected by the collective influence simultaneously (Jencks 1990;Kohen et al. 2002;Rankin and Quane 2000;Small and Newman 2001). Past researches had documented the significant negative impacts of living in disadvantaged communities. Comparing with low socioeconomic communities, students who live in high socioeconomic communities possess larger public institutions, lower-crime rate surroundings and owns higher educational expectation from others(Bellair 1997). The advantaged community provides more support for educational process of adolescents'. On the contrary, if the adolescents live in disadvantaged communities, all the surrounding functions posses by students living in advantage communities will be replaced by the exposure of risk(Garrett, Ng'andu and Ferron 1994;Jencks 1990;Rankin and Quane 2000;Sampson, Morenoff and Gannon-Rowley 2002). Inequality hence was generated and maintained.

In Taiwan, still quite few researches focus on the inequality of community. In fact, living in an advantaged community or in a disadvantaged community, students in Taiwan also have different exposure of living surroundings. Maybe that's because the deficiency of data or the difficulty to create suitable measurements. In order to access the impact of living in disadvantaged communities, two community variables, community SES and the urbanizations of school district, were constructed.

We seek to build upon this study by delineating the overall academic development of adolescences in Taiwan and testing three major contextual influences in order to have better understanding about the growing processes of Taiwanese adolescence and try to access the process of equality or inequality reproductions.

DATA SOURCES, VARIABLES, AND MEASURES

The data for study are from Taiwan Youth Project (TYP). TYP is a panel study conducted by the Family and Life Course Studies Project at the Institute of Sociology, Academia Sinica, Taiwan. The project is an eight-year longitudinal research scheduled from 2000 to 2007. The project consists of 2800 7th graders (J1 sample) and 2800 9th graders (J3 sample) as well as one of their parents and their head master of the class interviewed each year. The comprehensive research design covers various aspects of the interplay among family, school, and community in shaping teenager's future development. The overwhelming educational pressures resulted from the senior high school and college entrance examinations are of course a major concern of the study.

The sampling method of this project is divided into two stages. In the first stage, the research group focused their sample on junior high school students in Taipei city, Taipei county, and Yi-Lan county. They randomly selected 1,000 students each in Taipei City and Taipei County, and 600 students in Yi-Lan County. In the second stage, the stratified sampling method was used to determine the number of schools to be chosen from each of these counties or city based on the number of students registered. Then, they chose 40 schools from the pool, among them 16 are from Taipei City, 15 from Taipei County, and 9 from Yi-Lan County for both J1 and J3 samples separately. In each of the schools, two classes were chosen and all the students in the class were surveyed.

In this research we used data of J1 sample from the first through the seventh waves, when respondents were the 7^{th} graders in junior high schools through their first year in college. These seven-wave panel data were allowed us to assess the dynamic trajectories of adolescents' academic achievement and the effects of study contexts on them.

There are three variables regarding academic achievement of adolescents used as dependent variable, respectively. Academic performance in junior high period refers to students' *yearly achievement at 7th to 9th grades* measured by asking adolescent to response a question about her or his perceived class rank each year. The responses of class rank are coded from 1 = within rank 5 in the class to 5 = beyond rank 21 in the class. Ratings were reversely coded for the purpose of analyses and presentation. Therefore, high score reflects a better academic achievement at junior high school and low score reflects a poorer school achievement.

Second, with regard to the performance of high school admissions, *Students' percentile of scores of the Basic Competence Test (BCT)* was used in data analyses as an outcome variable with indicating adolescents' performance of high school enrollments. Third, for college admissions, *students' percentile of their scores of the General Scholastic Ability Test (GSAT)* was utilized. However, only the students who intended to aspire to enroll into colleges took the GSAT, lots of missing data were found in this variable. Thus, we also considered another measurement, *the types of colleges students enrolled in* as an outcome variable so that students' with different school aspirations were not excluded in the analyses. And, the types of colleges students enrolled in, named *college ranking*, were classified into six ordinal categories, including public university = 6, private university = 5, public technology college = 4, private technology college = 3, public vocational college = 2, and private vocational college = 1.

For students in their junior high, *prior school achievement* was included in order to control their performance at grade 6 in elementary school. *Gender, family SES,* and *serious health problem (1)* denotes key variables of individual characteristics. Parents' education is used as an indicator of respondents' *family socioeconomic status (SES)*. The number of years that adolescences attended to cram

school during their junior high period was coded as 0~3 as an indicator to evidence their *cram school participation (1).* The influences of class context were testified through the usages of two variables: the *class size* which reflects the numbers of students in junior high class and c*lass competition* which refers to the average of percentage of adolescents in the class who participated in cram school. Finally, both *class SES* and *community SES* were included as community covariates to examine the neighborhood effects on adolescents' academic achievement.

For students in their ***senior high period***, students' *serious health problem (2)* and their *cram school participation (2)* in their senior high school period were also included. To test whether different types of high schools on adolescent academic outcomes, we distinguished high schools into 5 rankings according to the general prestige of schools. The *ranking of schools* is coded as 0 = vocational high school, 1 = junior college, 2 = private high school, 3 = general public high school, and 4 = prestigious high school. Finally, the gender composition of their high schools was considered in the analyses as 1 = *sex-mixed school* and 0 = otherwise). The detailed description about all variables used in the analysis is displayed in Table 1.

Analytical Strategies

Focusing on the developmental processes of students' academic outcomes, we used latent growth curve models to delineate the trajectories of students' academic performances in junior high schools. And then these two latent variables (parameters) of students' academic growth curve, the initial status of academic achievement (intercept) and the growth rate of academic achievement each year (slope), were used to explain the corresponding percentiles of their BCT scores (PR values). Consequently, the PR value of adolescent was hypothesized to influence her or his college placements, including the corresponding percentile of their GSAT scores (PR

values) and the college types student enrolled in that is measured by an six-level ordinal variable. Furthermore, having estimating the growth curve of adolescent academic achievement, we then attempt to evaluate the contextual impacts on this academic development process. Thus, we examined the contextual impacts by employing variables about family, school, and community characteristics into analytical equation as covariates. Following, we assessed the influence of academic development of junior high on their high school admissions measured by BCT PR value and then extended to examine the impact of BCT PR value on GSAT PR value that represents the academic achievement in later high school and college period.

In model 1, we delineated students' academic developments from junior high schools to high school admissions without any covariates, and then, individual, family, school, and community covariates were included to interpret students' academic development outcomes in model 2. Consequently, college placements, GSAT PR value, and high school covariates were included in the analyses in model 3 and model 4. While model 3 examined the influences on academic achievement in GSAT in college enrollment, model 4 focused on students' college type they enrolled in. The research framework for model 3 and model 4 was shown in Figure 1.

Because our data have a multilevel structure in which students are clustered in their school classes and the research interests focused on the causal relationships among several latent factors regarding adolescent academic performances growth, multilevel structural equation models were used to address research hypotheses. Multilevel structural equation modeling allows researchers to combine full structural equation models with multilevel models so that the within and between school variations could be estimated simultaneously. MPLUS software was used in the model analyses.

Table 1: The summary of measurement of variables

Variable	Measurement (Range)
Dependent variable	
Achievement in the Basic Competence Test	Percentile of score of the Basic Competence Test (1-99)
Achievement in the General Scholastic Ability Test	Percentile of score of the General Scholastic Ability Test (1-99)
Yearly achievement in class, grade 7, 8, and 9	Perceived class ranking of academic achievement at grade 7, 8, and 9 (1-5)
College Ranking	The type of college was classified into six ordinal categories and coded 1 to 6.
Independent variables	
Junior High Period	
Prior school achievement	Perceived class ranking of academic achievement, grade 6 (1-4)
Sex	Male=1, Female=0
Serious health problem 1	Whether adolescent has a serious health problem, 1=yes
Family SES	Measured by father's or mother's education that has higher education in a 6-point index (1-6 high), centering by minus 1
Family economic problem	Whether family has an economic problem, unemployment and poor finance during adolescent's junior high period. Average of sum of economic problems during 3 years
Cram school participation 1	The number of years that adolescent has attended to cram school during junior high period (0-3)
Class size	Number of adolescents in junior high class, centering on minimum size 14.
Class Competition	Average of percentage of class adolescents who participate in cram school each year in junior high period
Class SES	Measured by the mean of parent's education of adolescents in the same class
Village tax index	Index of average tax paid by the households in village where school locates in year 2000
Urbanization of school district	Measured by the urbanization level of school district with 1=Taipei city, 2=Taipei County, and 3=I-Lan County and transferring to two dummy variables
Sex-mixed school	1=sex-mixed school

Table 1: The summary of measurement of variables (Continued)

Variable	**Measurement (Range)**
Senior High Period	
Serious health problem 2	Whether adolescent has a serious health problem in senior high period, 1=yes
Cram school participation 2	The number of years that adolescent has attended to cram school during senior high period (0-3)
Rankings of school	4=prestigious high school, 3= general public high school, 2=private high school, 1= junior college, and 0=Vocational high school
Sex-mixed school	1=sex-mixed school

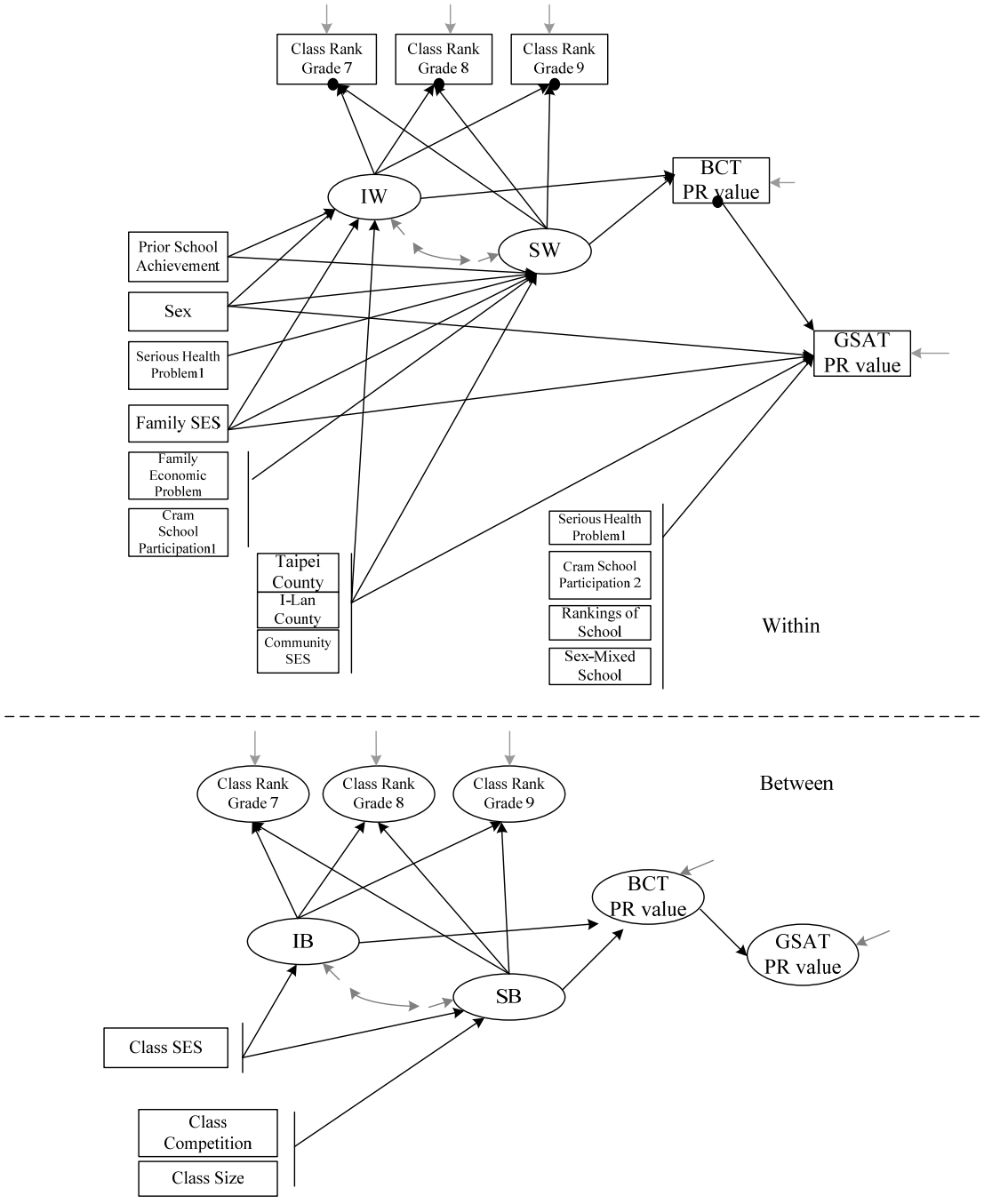

Figure 1: Research framework of this study

Findings

The descriptive statistics of variable used in this study is presented in Table 2. While the descriptive statistics in Table 2 reveal pronounced variation in Achievements in the Basic Competence Test in high school period and in the General Scholastic Ability Test in college admissions, our central goal is to investigate whether these variations in school academic achievement can be explained by the contextual effects of studying environment, including family, school, and community. Models in Table 3 shows the results of development trajectory of adolescent's school academic achievement in terms of initial status and change rate of growth curve both in the individual level (within level) and in the class level (between level). Owing to the measurement of yearly achievement in Junior high school being ordinal scale coded from 1 to 5, the analysis of the mean of each class in class level shorts of conceptual meanings. However, for the model completeness in the multilevel structural equation modeling, we still need to keep the class level in the analysis so that the model estimation is able to be done. It is worth noting that we do not need to pay attention on the result of class level, we focus only on interpreting the results of individual level.

As shown in Model 1, initial school achievement of adolescent at grade 7 has a significant effect on her or his achievement in the Basic Competence Test. It indicated that the better academic performance in class, the higher percentile obtained in BCT. Also, a larger change rate of school achievement of adolescent during junior high period will lead to a better performance in BCT. In addition, initial school achievement of adolescent at grade 7 is significantly influenced by her or his school achievement at primary school (grade 6). And, a significant negative coefficient of prior school achievement on change rate of school achievement of adolescent during

junior high period indicated that generally a student with better academic performance in primary school makes a slower progress of achievement in her or his junior high. In short, a performing well student from primary school is expected to have good achievement in the initial year in junior high and change slower in academic achievement than her or his counterparts with poorer achievement. As a result, a better performance of school achievement in junior high in terms of initial status and change rate of achievement growth curve will further lead to a better performance in BCT.

In order to explore the contextual effect on school achievement growth combining with examining the effect of school achievement development in junior high on BCT performance, we further consider adolescent's sex and family SES on initial status of school achievement in junior high and, at the same time, to consider additional six contextual variables on change rate of school achievement, including family economic problem, serious health adolescent had, cram school participation, village tax index, two dummy variables about urbanization of school.

Except for the findings discussed above, Model 2 of Table 3 additionally shows that male adolescent has a low school achievement in grade 7 than female, but males' school achievement progress in a larger magnitude than that of females. It is also found that adolescents from higher SES families or communities have better school achievement at grade 7, but their achievement growth in school displays no significant difference from that of their counterparts. Moreover, adolescents with serious health problems in junior high result in a lower growth of achievement and if adolescents who participated in cram school during junior high do show a significantly higher growth in their school achievement that further come out with a better BCT performance. Adolescents who were studying in Taipei County have a higher growth rate in school achievement than adolescents from Taipei City and I-Lan

County. This finding is reflected that the urbanization of school districts is related to school achievement of their students in school. It is noted that the effect of change rate of school achievement on BCT performance increases by 16 percent after taking the contextual effects of family, school, and community into account.

The findings discussed thus far reveal that the school achievement of adolescent is substantially influenced by the achievement in primary school, either in initial achievement or in achievement progress and that both parameters of achievement growth have strong impact on the performance of BCT for continuity and whereabouts of high school education. The above findings also provide the evidence to support that both family context and community context have a significant impact on adolescent's achievement either on initial achievement or on achievement growth. The previous research has been less evident in the extent to which how initial achievement in high school, reflected the achievement development from junior high, further continuously affects the performance in entire high school period measured by the GSAT performance.

In order to address the above research interest, we conducted an analysis with GSAT PR value as dependent variable and the results are listed on Model 3 in Table 4. With the significant effect of BCT PR value on GSAT PR value, the results provide additional support to argument that school achievement in the earlier stage of life are more likely to determine the academic achievement in the later stage. Moreover, to further examine the effect of family, school, and community contexts in adolescent's senior high period on the academic achievement, we also include the contexts variable of senior high as additional covariates in Model 3. The results indicate that adolescents from better high school (higher ranking of high school) and attending cram school in high school period do strongly affect the GSAT performance. This finding also implies that family contexts and school contexts in senior high period, but

not community context, determine the academic performance and obtain admissions to the different type of colleges or universities.

While the above analyses are focused on the BCT PR value and GSAT PR value, we expand our interest to an issue regarding how adolescent's study contexts influence the choice of higher education, rather than the achievement score measured by GSAT PR value. The results shown in Table 5 demonstrate that as expected, the initial achievement in high school has determined the position of college or university education. Besides, both the participation of cram school in high school period and rankings of high school are also contributed to academic achievement of adolescents. The direction of influence is both as expected. That is, the higher participation of cram school and the high ranking of high school reputation in general of adolescents will significantly increase the likelihood to enter higher colleges or universities. However, the variable of village tax index has a negatively significant effect on the ranking of college that adolescent pursues. That is, net of the effect of other covariates, adolescents those who come from high SES communities tend to go to the lower ranking college. Similarly, adolescents residing in I-Lan County are more likely to attend the higher ranking college or university, controlling for the effect of other context variable. In closing, we note that the academic achievement of adolescent perhaps has a long-term effect from primary school to junior high school, and then to senior high school as well as to college or university. And, different types of adolescent's study contexts play saliently different roles in structuring the achievement performance across different life stages.

Conclusions

We pursued two interlocking objectives in this paper: to show the development trajectory of adolescent's school achievement in a life course perspective and to shed light on the influence of three main study contexts on achievement development. In addressing the first objective, we have presented some evidences that suggest the prior school achievement strongly determines the attainment of education in the later educational stages. The findings from growth curve models and two-level structural equation models might raise two arguments: first, individual educational attainment predominately depends on the earlier school achievement, particularly on the school performance of primary school. If this is the fact, it is argued that educational institutions in different levels seem not to play the salient role of "inequality equalizer." In addition, we also found that family contexts, in particular, family resources in terms of family SES and participation in cram school have partly effect on initial school achievement and partly on growth rate of achievement. Indeed, family resources might have strong impact on school achievement even in primary school through various trainings and parental involvement. Apparently, family SES plays a considerably long-term influence on individual educational experience. Second, educational institutions of different level seem only to continuously convey and strengthen ability for the students with better achievement pursuing the better and higher education opportunities. The onset disadvantages persistently appear to individual with lower achievement. That is, once adolescents have become academically disadvantages in her or his earlier stage of life, then she or he might hardly overcome this limitation of changing educational attainment if the school that she or he attends has no evolutional strategies or polices to improve school's education. More research focused on the issue mentioned above should be conducted

in the future to improve the limitation for adolescents with early disadvantage in school achievement.

Regarding the second objective of this study, we conducted a structural equation modeling procedure in which incorporated in family, school, and community factors to examine the contextual effects on adolescent's school achievement. It is surprising that adolescent's participation in cram school has a significant effect on academic achievement either in junior high or in senior high period. Indeed, it is the reason why the cram school participation is so popular among adolescents in Taiwan. However, it is not expected to occur in a formal education system if it is able to effectively make progress in adolescent's school no matter which onset level of her or his performance. It is expected that more educational intervention to enhance the function of the regular school education so that the participation cram school among adolescents is able to be freed.

Notwithstanding the contextual effects of adolescent achievement were partly found in influencing the initial achievement and partly in growth rate of achievement, but these findings are based on the sample of academic-track adolescents. However, the fact that 20 percent of adolescents select to enter the labor market in our study sample, rather than going continuously to high school, may be attributed to certain degree of selection bias due to excluding them out of current analysis. Therefore, considering a statistical method with which we can estimate the influence with the inclusion of all adolescents in the sample is further research work in the near future.

Table 2: Descriptive statistics of variables used in this study

Variable	Mean	Std.	Min	Max
Dependent variable				
Academic achievement in class				
Class rank in grade 7	3.05	1.21	1	5
Class rank in grade 8	3.11	1.23	1	5
Class rank in grade 9	3.04	1.23	1	5
Achievement in the Basic Competence Test	55.94	26.32	5	99
Achievement in the General Scholastic Ability Test*	20.06	31.79	0	99.81
College Ranking**	2.25	2.31	0	6
Independent variables				
Junior High Period				
Prior school achievement	1.45	1.00	0	3
Sex	0.48	0.50	0	1
Family SES	2.04	1.22	0	5
Family economic problem	0.27	0.35	0.00	1.67
Serious health problem 1	0.06	0.15	0	1
Cram school participation 1	1.86	1.19	0	3
Class size	21.64	4.38	0	34
Class Competition	0.55	0.17	0.10	0.85
Class SES	3.01	0.57	2.09	4.56
Community SES	33.26	11.37	17.91	100.00
Urbanization of school district				
Taipei County	0.38	0.48	0	1
I-Lan County	0.23	0.42	0	1
Senior High Period				
Serious health problem 2	0.25	0.56	0	3
Cram school participation 2	0.94	1.14	0	3
Rankings of school	1.58	1.56	0	4
Sex-mixed school	0.83	0.38	0	1

Table3 Models of adolescent achievement in BCT

	Model 1									Model 2									
Student level(Within)	**Intercept(IW)**			**slope(SW)**			**BCT(W)**			**GAST(W)**	**Intercept(IW)**			**slope(SW)**			**BCT(W)**			**GSAT(W)**
IW							20.312	(0.328)	***								20.229	(0.341)	***	
SW							29.848	(3.862)	***								34.723	(4.384)	***	
Prior School Achievement	0.868	(0.018)	***	-0.031	(0.009)	***					0.814	(0.019)	***	-0.042	(0.010)	***				
Sex											-0.119	(0.040)	***	0.032	(0.018)					
Family SES											0.158	(0.015)	***	0.009	(0.007)					
Family economic problem														0.013	(0.019)					
Serious health problem 1														-0.127	(0.042)	**				
Cram school participation 1														0.042	(0.006)	***				
Village tax index											0.008	(0.002)	**	-0.001	(0.001)					
Taipei County											-0.066	(0.034)		0.059	(0.018)	***				
I-Lan County											0.056	(0.042)		0.021	(0.015)					
Class level(Between)	**Intercept(IB)**			**slope(SB)**			**BCT(B)**			**GSAT(B)**	**Intercept(IB)**			**slope(SB)**			**BCT(B)**			**GSAT(B)**
IB							-22.793	(4.337)	***								-17.547	(3.795)	***	
SB							-15.059	(39.212)									-72.921	(14.800)	***	
Class SES											-0.429	(0.062)	***	0.029	(0.015)					
Class size														-0.010	(0.002)	***				
Class competition														-0.153	(0.036)	***				
Numbers of Cases	2339										2046									
AIC											28503.743									
BIC	32783.526										28700.57									
RMSEA	0.039										0.058									
Loglikelihood MLR	-16321.946										-14216.871									

Table4 Models of adolescent achievement in GSAT

	Model 3											
Student level(Within)	**Intercept(IW)**			**slope(SW)**			**BCT(W)**			**GSAT(W)**		
IW							19.781	(0.387)	***			
SW							29.101	(4.125)	***			
BCT PR value										0.332	(0.023)	***
Prior School Achievement	0.813	(0.021)	***	-0.043	(0.011)	***						
Sex	-0.098	(0.042)	*	0.036	(0.021)					2.331	(1.289)	
Family SES	0.152	(0.015)	***	0.005	(0.008)					1.410	(0.629)	*
Village tax index	0.008	(0.002)	**	-0.001	(0.001)					-0.123	(0.094)	
Taipei County	-0.072	(0.038)		0.069	(0.021)	**				1.908	(1.473)	
I-Lan County	0.036	(0.048)		0.022	(0.018)					-0.149	(1.862)	
Junior High Stage												
Family economic problem				0.008	(0.023)							
Serious health problem 1				-0.137	(0.048)	**						
Cram school participation 1				0.033	(0.007)	***						
Senior High Stage												
Serious health problem 2										0.120	(1.014)	
Cram school participation 2										4.974	(0.703)	***
Rankings of school										6.299	(0.505)	***
Sex-mixed school										-2.082	(1.917)	
Class level(Between)	**Intercept(IB)**			**slope(SB)**			**BCT(B)**			**GSAT(B)**		
IB							-19.068	(3.794)	***			
SB							-89.118	(19.758)	***			
BCT PR value										0.260	(0.083)	**
Class SES	-0.480	(0.066)	***	0.038	(0.016)	*						
Class size				-0.009	(0.002)	***						
Class competition				-0.119	(0.032)	***						
Numbers of Cases	1750.000											
AIC	40400.83											
BIC	40668.73											
RMSEA	0.09											
Loglikelihood MLR	-20151.41											

Table5 Models of adolescent college ranking

	Model 4									
Student level(Within)	**Intercept(IW)**			**slope(SW)**			**BCT(W)**			**College Ranking(W)**		
IW							19.787	(0.387)	***			
SW							29.077	(4.135)	***			
BCT PR value										0.027	(0.002)	***
Prior School Achievement	0.815	(0.021)	***	-0.043	(0.011)	***						
Sex	-0.099	(0.041)	*	0.036	(0.021)	**				0.127	(0.090)	**
Family SES	0.151	(0.015)	***	0.006	(0.008)					0.089	(0.047)	
Village tax index	0.008	(0.002)	**	-0.001	(0.001)					-0.014	(0.007)	*
Taipei County	-0.073	(0.038)		0.068	(0.021)	**				0.201	(0.110)	
I-Lan County	0.035	(0.047)		0.020	(0.018)					0.436	(0.148)	**
Junior High Stage												
Family economic problem				0.009	(0.023)							
Serious heal h problem 1				-0.135	(0.048)	**						
Cram school participation 1				0.033	(0.007)	***						
Senior High Stage												
Serious health problem 2										-0.029	(0.089)	
Cram school participation 2										0.391	(0.059)	***
Rankings of school										0.187	(0.041)	***
Sex-mixed school										-0.092	(0.128)	
Class level(Between)	**Intercept(IB)**			**slope(SB)**			**BCT(B)**			**College Ranking(B)**		
IB							-18.944	(3.755)	***			
SB							-92.597	(19.924)	***			
BCT PR value										0.014	(0.007)	*
Class SES	-0.479	(0.065)	***	0.036	(0.016)	*						
Class size				-0.009	(0.002)	***						
Class competition				-0.116	(0.031)	***						
Numbers of Cases	1753											
AIC	31729.18											
BIC	31997.16											
RMSEA	0.09											
Loglikelihood MLR	-15815.589											

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