The Developmental Outcome of Taiwanese Youth: Educational Tracking and the Psychological Well-being

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I. Introduction

` Over the last few decades, youth studies have revealed an intense interest in subjects such as the educational and occupational trajectories, parental and peer influences, deviance, leaving home, and mental health (Furstenberg, 2004). In the East Asia, a unique and shared social experience for adolescents which lacks systematic investigation is the examination pressure from the competitive educational system. Adolescents growing up in such a social context constantly face the strong expectation and pressure of doing well academically from family, school and society. For a typical junior or senior high school student in Taiwan, long hours of study at school, at the cram class and at home have replaced the time for sleep and leisure (Yi and Wu, 2004). Therefore, exploring how examination pressure affects changes of mental health will enable us to delineate potential consequences of the educational system on the developmental outcome of adolescents.

Using mental health as an indicator to depict the growth patterns of adolescents has been a common practice especially in cross-societal comparisons and in the longitudinal panel design. Mental health is considered a suitable subject because it reflects the subjective and objective reactions and adjustment of adolescents toward external environment (Amato and Sobolewski 2001; Fitzpatrick et al 2005; Mcleod and Fettes 2007). Previous studies have emphasized the close linkage between mental health and the educational outcome, especially the effect of childhood and adolescent depression for the educational attainment (Fletcher; McLeod and Kaiser 2004; McLeod and Fettes 2007). It is often assumed that the negative association between teenagers with mental health problems and the educational attainment is largely due to the inherent cognitive deficit as well as the discouragement in the early-life social environment (Farkas, 2003; Entwisle et al 2003). Other reports aiming at the opposite direction between education and mental health point out that less educational levels are associated with higher depressive symptoms (Thurston et al 2006; Yang 2000). Overall, internal and external problems since childhood are considered to determine the educational trajectory for adolescents.

In Taiwan, a common reaction toward the association between education and mental health tends to be that educational or examination pressure results in degrees of mental health problems. The reason for this mode of thought can be attributed to the existing educational system. Taiwanese educational system is characterized by the entrance examination which take place at two different stages: from junior high to senior high or senior vocational high schools, and from senior high or senior vocational high schools to university or technical colleges. During this stage of six years, school curriculum as well as student's daily routine are all dominated by the

preparation of taking entrance examinations. Situated in the competitive educational environment, the demand and expectation from the family as well as interaction with teachers and classmates at school have formed the immediate source of network and of pressure which produce important effects on the psychological well-being of Taiwanese youth (Yi et al forth coming).

Therefore, this study will examine the growth trajectory of adolescent's mental health in the context of highly competitive educational system in Taiwan. Our basic argument is that although adolescent's mental health tends to closely associate with the educational performance, educational tracking outcome may have more significant influence on the mental health state for Taiwanese adolescents. In order to analyze potential effects of the important turning points of educational tracks, the time frame will set from early adolescence to young adulthood which corresponds to the first year in junior high school (average age 13) to second year in college (or average age 20). Among various mechanisms accounted for the development of mental health trajectories, family and school are most salient social context for adolescents and will thus become our focus. Findings will allow us to ascertain general patterns of different tracking outcomes on the psychological well-being, it will also enable us to identify specific family and school mechanisms crucial for the long-term psychological effect for adolescents in Taiwan.

II. The Educational System and Family Relations in Taiwan

It may be hard for outsiders to understand the normative expectation of growing up in the competitive environment in East Asia. Innovation and curiosity in learning has not been considered important child rearing values in Taiwan (Yi et al 2004). Hard working and obedience are regarded essential characters for success (Hsu 1948). The educational system, constrained by the fairness demand in the comprehensive entrance examination, has revealed conservative attitudes which encourage repeated memorization in order to provide exact correct answers. With little room for personal ideas or responses in the educational system, traditional learning pattern is reinforced which echoes the underlying educational values.

For typical Taiwanese adolescents, the first educational tracking occurs at the end of the compulsory education of nine years (i.e, six years of elementary school and three years of junior high school). Because the educational reform since mid-90s has mostly expanded the number of colleges, not high schools, the high school entrance examination has thus become even more competitive. One evidence is that higher cram class attendance rate of junior high students than senior high students has been documented as a response to the educational competition (Chang and Yi 2004).

Furthermore, despite the increasing availability of colleges, good universities remain limited few and are highly valued by more competitive students from better ranking senior high schools (Ibid.). As a result, different pressure may be observed among different student groups with high achievers striving to enter desirable universities in contrast with middle and lower ranking students working toward second tier or technical universities. On the other hand, for high school graduates with no plan for college entry, they constitute the minority and may perceive double pressure from societal expectation of getting descent jobs and from comparisons with the educational attainment of their counterparts.

From the life course perspective, the educational tracking outcome undoubtedly presents different life domain for adolescents. The consequence on individual mental health is particularly acute when educational system is

III. Development of the Psychological Well-being for Adolescents

Family Context

Family is the first socialization institution an adolescent encounters in the life course. Family resources or family-based social capital play a vital role in the growth trajectories of youth (Teachman 1987; Crosnoe and Elder 2004). One particular family resource significantly contribute to the positive developmental outcome is the parental involvement at home and at school (Coleman 1991; Horn and West 1992; McNeal 1999 Crosnoe and Elder 2004). Previous studies point out that effect of the parental involvement is often conditioned by or at least more pronounced if the emotional closeness is reported between parent and adolescent (Crosnoe 2004; Call and Mortimer 2001; Carborano 1998). In other words, family relations are basis for the development of adolescents.

Parental Involvement and Family Relations

There is a consensus of the salience of parental involvement in the life course for adolescents (Demo and Cox 2001; Lareau 2003; Bulanda 2004; Deutsch 2004). Bronfenbrenner suggests that parental involvement at this stage implies the influence of family processes on adolescent's school performance, thus it can be regarded as the most important linkage between family and school in the life domain of youth (1979, 1986). Parental involvement in children's education is often examined by attending parent-teacher association, supervising academic progress, discussing school related issues and helping with homework at home. Numerous reports ascertain the significant contribution parental involvement has toward children's school performance (Steinberg et al., 1992; Stevenson and Baker 1987; Bogenschenider 1997;

Rumberger et al 1990). In contrast, the potential impact that parental involvement has on the other developmental outcome—adolescent's mental health—is seriously overlooked.

Parental involvement can be considered an aspect of family relations because it involves both the manifestant parental concern for children's well-being and the underlying parental aspiration for children's educational success. When specific actions are taken within the family context, in addition to the expected positive consequence, intense interaction pattern may appear due to the conflict of educational aspiration and the subsequent pressure imposed between two generations (Luscher 2002). A recent study indicates when parents closely monitor children's behaviors during junior high, higher depressive symptoms are observed (Yi et al forthcoming). The implied educational aspiration is the likely factor resulting in the negative mental outcome for adolescents (Yang 2007).

With regard to family relations in general, parental support has been documented to produce positive effect on teenager's cognitive, behavioral and psychological outcome, it also serves as an important buffer reducing the occurrence of negative symptoms (Gecas and Seff 1990; Fitzpatric et al 2005). For adolescents facing external risks or dangers, family support and concern provide the protective function which results in healthy youth development (Wheaton 1985; Denny et al 2005). Although the emotional aspect in the family is a significant factor explaining the psychological well-being of adolescents, most studies have restricted to the dyadic relationship between youth and one significant other (Wu 2007). The emotional bond or the family cohesion revealed at the family level is equally important affecting the psychological outcome of individual families. In other words, family cohesion expressed by the support and cooperation as well as competition and antagonism among family members is regarded as the structural opportunity and constraint at the family level, which is presumed to produce short-term and long-term influence on the adolescent growth trajectory.

The Taiwanese Setting

In Taiwan, parental involvement in the children's educational process is perhaps a normative expectation. In the West, while parental control often implies authoritarian practice which leads to the negative consequence for children (Baumrind 1978; Bulcroft et al 1996), the authoritative style--constituted by high support and inductive control—has revealed different and positive outcome (Maccoby and Martin 1983 Owens et al 1996). In this line of discourse, there is an indigenous concept in the Chinese family which describes well the culturally endorsed parenting practice: Guan (Shek 1998; Chao 1994). Guan can be defined by two simultaneously existing

components, with high control and high support on the one hand, and guided involvement in children's routine as well as in future plans on the other. A typical social response toward parents who respect children's any decision without interfering with undesirable behaviors or plans is not recognized as responsible parents. The persistent cultural norm endows parents with obligation to "guan" children. As the recipient in the socialization process, children usually can perceive the positive message conveyed from parental practices which encompass high involvement, high support as well as high concern. Unfortunately, the effect of 'guan" remains at the discussion of the theoretical level, further empirical investigation is needed in order to verify the potential contribution of this typical concept of Chinese parenting.

With educational competition as the contextual background, the most observed parental "guan" at this stage includes monitoring children's interaction with friends, regulating daily routines and studying. These behaviors along with other practices in the family, such as accommodation (i.e., teenager has the priority to choose TV program and to use the bathroom facility, etc.) and physical provision, are labeled as the family educational strategy. The aim of applying various family educational strategies is to provide better studying environment so as to benefit the educational progress of the adolescent. Nevertheless, while enjoying the privilege at home, children in the preparation of entrance examination also perceive the parental educational aspiration as well as the pressure affiliated with the family culture. Since behavioral monitoring has shown to negatively influence the psychological well-being of early adolescents (Yi et al forthcoming), it will be interesting to explore potential effects of specific family provision in terms of study space and special food. The physical practice at home has more direct and clearer implication of parental involvement in the educational aspiration as well as the consequent educational performance of adolescents.

Social Class Differences

Since parental involvement in children's educational process tends to reflect the social class variation, parent's socio-economic status has been taken as the family context which results in children's different educational and mental health outcome (Ho and Willms 1996; Bogenschneider 1997; McLeod and Fettes 2007). Overall, inadequate family resources are shown to associate with less cognitive stimulus at home and with limited after-school learning activities (Lareau 1989, 2003). Furthermore, despite findings that better school environment benefits the development of adolescents from disadvantaged families (Lee and Smith 1997), the majority of studies points out that family resources exert varying effects depending on the social class differences. Specifically, parental involvement is likely to achieve magnifying

effect for the school performance among students from middle upper classes, but not on adolescents from disadvantaged families (Schneider and Coleman 1993; Morgan and Sorenson 1999; McNeal 1999; Crosnoe 2004). Similar results have been reported among Taiwanese adolescents in that not only family SES has consistent influence on children's educational performance, parental education is shown to produce more salient effects than family income (Tan 200?).

With regard to the linkage between social class differences and mental health, previous studies seem to emphasize more on personal resources, especially the educational level (Berndt et al 2000; Yang 2000; Thurston et al 2006). Family or parental SES is relatively less investigated, let alone the complexity of its effect on the mental health growth trajectory of adolescents in the midst of educational competition. Hence, this paper will incorporate parental education as an indicator of family social class background and will explore its possible linkage with adolescent children's psychological well-being.

School Context

The above discussion point out that the intra-familial process concerning children's development is constrained by the external environment, of which school is certainly the most closely linked external context (Lerner 1991, 1995; Bronfenbrenner 1986). School is an important social capital for adolescents. Differences in school resources as well as in school attributes significantly influence the growth trajectory of adolescents (Morgan and Sorenson 1999; Harris et al 2002; Crosnoe et al 2003). Previous studies exploring the potential effect of school context largely focus on the role of peers and teachers, relatively less attention has been laid on the school-level measures. However, structural characteristics embedded in the educational system has been proven to significantly shape the individual development (Bronfenbrenner and Crouter 1983). Educational tracking patterns as well as the average parental SES of the school are shown to exert pronounced effects on the student's performance (Alexander and Eckland 1975; Alexander et al 1978; Crosnoe 2004). A recent comparative study of twelve countries presents powerful evidence proposing the importance of institutional context in that student's educational aspiration is mainly determined by the type of school system (e.g., differentiated secondary education), not by interpersonal influence such as peers and parents (Buchmann and Dalton 2002). Since Taiwan falls into the category of differentiated secondary education, early educational tracking system with inherent educational hierarchy may not only affect the educational aspiration for adolescents, but has strong impact on the developmental pattern of mental health status as well.

The Classroom Effect

For Taiwanese adolescents, a substantial proportion of available time is spent at school which makes the school experience an essential component in studying the growth trajectory of adolescents. Take the depression study for example, individual factors such as academic scores, peer relations, teacher-student interaction, school evaluation, and school or classroom factors such as campus violence and threat, pressure of success, deviance etc., have been documented to produce important effects on individual psychological well-being (Jessor 1992; Fitzpatric et al 2005; Denny et al 2004; Haavet et al 2005; Wu and Lei 2005). These studies encompass adolescents from minorities in the U.S. to Scandinavian youth, from home schooling in New Zealand to Taiwanese junior high students, with a common concern on how to decrease the risky experience at the school context.

In East Asia and in Taiwan, the core structure of middle school is the school class or classroom. When a student enrolls in the junior high, he or she is assigned into a class with a designated teacher who leads the classroom operation besides teaching the specialized course. For subsequent years, the same teacher will have daily interaction with the class, and classmates will generally remain the same (except few transferals). Hence, the school context for typical Taiwanese adolescents is actually the classroom where most school experiences take place.

The classroom effect has aroused attention only quite recently. From limited reports, classroom is shown to be the locus of studying adolescent's deviant behaviors (Wu and Lei 2005) and is important to predict the future development of psychological well-being (Yi et al forthcoming). One particular concern here is to capture the unique educational phenomenon in Taiwan which is often revealed by the intra- as well as inter-classroom competition and can be considered as the outcome of competitive and repeated examinations. We suspect that the classroom culture characterized by the cooperative or the competitive atmosphere at the aggregate level will have profound influence on the psychological well-being of adolescents. In addition, the classroom culture as reflected in the social bonding among classmates is another salient aspect to be considered. The classroom cohesion perceived and reported by adolescents is especially meaningful under the constant competition for academic performance at school. Therefore, the classroom effect will be explored with regard to its potential linkage with the individual developmental outcome.

Role of the Teacher

The conventional research focus of the school context mainly concerns the influence of peers and teachers, such as friendship network, and the constraint of the school environment (Barton and Cohen 2004 South and Haynie 2004; Hsieh et al

2006). As delineated above, this study will emphasize the potential salience of one structural feature, namely the classroom effect, in order to illustrate the impact of the examination competition in the educational system in Taiwan. A related key factor essential for the growth trajectory of adolescent's psychological well-being is the role of teacher (Jussim and Harber 2005; McLeod and Fettes 2007). Support and caring of teachers can effectively reduce the risk of depression for students (Wu et al 2004), it also contributes to the sense of security as well as the overall psychological adjustment of students (Fitzpatric e t al 2005). Furthermore, teacher's evaluation of students or the view the teacher hold toward students actually represent one type of social response consequential for the developmental outcome of student's performance (McLeod and Fettes 2007). In other words, there is a selective process in the school context which may produce long-term effect on adolescent's mental health trajectory, and teacher's role is certainly an important constituent.

With regard to interactions between teacher and student, it is perhaps universal for teachers to show certain favorable attitudes toward students with good grades. It is also common for students with less academic performance to complain the unfair treatment teachers apply to different students. Since the role of designated teacher in the classroom is of particular salience in the Taiwanese context, it is important to investigate the crucial function teachers perform in the developmental outcome of adolescents. In this context, we share the perspective proposed by McLeod and Fettes (2007) that the psychological well-being of youth is not regarded as the consequence of socio-economic background only, but a product of the interaction between adolescent and significant others in the family and school domain.

In brief, this study will examine the developmental outcome of the psychological well-being for Taiwanese youth. With two educational tracking path as the structural background, an attempt will be made to focus on the group level mechanisms in both the family and the school context so as to emphasize the structural explanation of the youth development. Furthermore, the indigenous educational strategy applied at home and at school will be explored in order to ascertain its potential function and to add to the existing literature of the growth trajectory among East Asian youth in general, and the Taiwanese youth in particular.

IV. Data and Method

Methods

1. Data and Sample

Data are taken from the Taiwan Youth Project (TYP), a panel study based at the

Institute of Sociology, Academia Sinica, Taiwan. The project was started in year 2000, and has conducted 8 waves of interviews since then. The original respondents of this project include 2,800 7th graders (1st grade of the junior high) and 2,800 9th graders (last year of the junior high) as well as one of their parents and their designated teacher of the class. The goal of the comprehensive research design is to examine various aspects of the interplay among family, school and community, which shape adolescents' future development.

Students were sampled from junior high schools located in the northern part of Taiwan: Taipei City, Taipei County, and Yi-Lan County. Since 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. Specific sampling method applied by TYP was multi-stage stratified cluster method. Due to the weighting concerns, one thousand students each in Taipei City and Taipei County, and five hundred students in Yi-Lan County were decided. Using different criteria of the urbanization level, each city/county was classified into different strata. Then dividing numbers of junior high students in each stratum from all junior high in the county/city, the sampling number of each stratum was derived. Since a pre-determined principal were (1) to sample the whole class (instead of selected random students in the class) and (2) to choose two random classes per school, number of classes in each county/city needs to be decided. We use the ratio of sampling number of each stratum and mean student numbers of the class in each county/city to derive needed classes and schools. 40 junior high schools--16 from Taipei city, 15 from Taipei County, and 9 from Yi-Lan County—was randomly selected. In each of the schools, two classes were randomly chosen and all the students and their parents in the 81 classes were surveyed. In each class, the designated teacher was asked to report the school related performance of each student in his/her class.

This study uses the original 7th graders in the first wave. The size of the student sample successfully interviewed in the first wave was 2,690. For the last wave (i.e., the 8th wave), there are still 1,739 samples remained with the attrition rate is 35.35%.

Since this study attempts to examine impacts of different educational tracks on the development of depressive symptoms, only respondents who completed high schools or vocational high schools are included in the analyses. Thus, respondents who discontinue their education after graduation from junior high schools (about 3.8%) and those who entered junior colleges (about 3.1%) are omitted in the analyses. Among respondents with at least high schools or vocational high schools education, those who have missing values in independent variables are listwised. The final sample size of this study is 1,095.

2. Measures

Adolescent depressive symptoms

The dependent variable in this study, depressive symptoms, is adopted from the short version of Symptom Checklist-90-Revised (SCL-90-R, Derogatis, 1983) which measures the frequency of seven symptoms occurred during the past week: headache, loneliness, depressed mood, insomnia, feeling numb or punctured in certain parts of the body, feeling congestion at throat, and weakness in certain parts of the body[1]. Each item is rated on a 5-point scale from 1 (never) to 5 (oftentimes). The Cronbach alphas for this scale over the eight waves ranged from .70 to .83.

Educational Track

There are two major educational tracks in the Taiwanese educational system. The first tracking occurs after the compulsory elementary education (6 years) and the junior high education (3 years): students either enter high schools or vocational high schools; a minority chooses to enter the 5 years college. The second tracking takes place three years later with two main paths of regular university versus technical university (both 4 years). For this study, respondents' educational tracks are measured according to the types of schools attained after graduation from junior high schools and the highest educational attainment by year 2007, the time they were last interviewed. Accordingly, four educational tracks are distinguished: (1) vocational school graduates who did not enter college, (2) high school graduates who did not enter colleges, (3) vocational school graduates who enter colleges, and (4) high school graduates who enter colleges. These tracks are coded as dummy variables (yes =1, no=0), and respondents who fall into the high school tracks (group 2 and group 4) serve as reference groups in the analyses.

Family Cohesion

A scale contains four questions on cohesive behaviors at the family level is used to measure family cohesion. During the junior high years, adolescents were asked whether the following statements fit with their own family situation: their family discusses with each other when making decisions; every family member participates in family-related activities; the respondent always receives comfort from family when feeling frustrated, the respondent can rely on family members when needing help or advice. Response category for each question range from 1 (low fit) to 4 (high fit), and are summed to one total score. The scale construction shows alphas of .76 to .79 over the three-year period. The average of summed scores in these years is used as the measure of family cohesion during junior high.

[1] In the seventh wave of survey, only "loneliness" and "depressed mood" were measured. The depression scores of this wave were weighted by 7/2 to fit the range of scores in other waves.

Physical Provision

The family educational strategy has been contended as a response to the highly competitive entrance examination at the family level. For this study, the aspect of physical provision is adopted to represent familial involvement in the process. Adolescents were asked whether each of their parents provide better nourishment or arrange better space for study for the preparation of the entrance examination. Dummy measures (yes =1, no=0) are used to indicate each parent's behavior. The alpha is 0.70, and the sum of both parents' involvement with a range of 0-4 represents the degree of physical provision provided in the family.

Father's Education

Father's education is used as an indicator of respondents' family socioeconomic status. The measure includes seven levels of educational attainment (1 = elementary school or below, 7 = graduate school). We use the first three waves of surveys to derive this indicator.

Classroom Cohesion

When adolescents enter junior high schools, each of them is assigned to a specific class which becomes their immediate school environment. Prior research (Yi et al. forthcoming) shows the classroom cohesion is inversely related to adolescents' depression levels. It will be interesting to ascertain if the effect remains when different educational tracks are taken into account. The classroom cohesion is measured by the degree of consistency of adolescents' school experiences: "In my class, my classmates always help me whenever I need them;" "I don't like to interact with my classmates;" and "Our classmates are close to one another as if we were a family." Response ranges from 1 (low consistent) to 4 (highly consistent). The alpha scores across three years range from 0.67 to 0.72. The average of summed scores is used as the measure of classroom cohesion during junior high years.

Inter-Class Competition

In order to enhance students' academic performance, different educational strategies are implemented in the school. These strategies often convey a strong implication of educational competition at the school context. There are typically three exams during each semester, and most junior-high schools rank each class in the same grade by the average exam scores. It is presumed that this competitive strategy will encourage future progress. The inter-class competition may cause extra stress to students and to designated teacher of the class as well. In the following analysis, inter-class competition is measured by a question raised in every junior high year: 'Compared with other classes of the same grade in your school, how is the academic performance of your class?" A five-point scale ranges from 1 (being much worse) to 5 (being much better) is provided for the evaluation. The average score in the three

years is used as the measure.

Unfair treatment of teachers

In the school environment that highly emphasizes academic performance, such as junior high schools in Taiwan, it is not uncommon for teachers to show favorable attitudes toward students with better performance. Prior study (Yi et al., forthcoming) shows a significant relationship between unfair treatment by junior high teachers and students' depression over time. Investigation will be made to see if this association varies among students with different educational tracks. Unfair treatment by teachers is measured by a four-category ordinal scale (1= never, 4 = always) to the question: "In your class, is the designated teacher usually nicer to classmates who have better grades?" The mean of the answers in the first two years of the junior high is applied as the measure of this variable.

Academic performance

During three junior high years, the academic ranking in the previous semester for adolescent samples was asked in each interview. Five rankings—top 5 in the class, rank 6 to 10, rank 11 to 20, rank 20 to 30, and rank behind 30—are reversely coded from 5 to 1. The individual average ranking in class during three years is used as the indicator of adolescents' academic performance.

3. The Analytic Strategy

The purpose of this study is to investigate whether individuals proceed with different educational tracks would exhibit different trajectories of depressive symptoms from early adolescence to young adulthood. As mentioned in previous paragraphs, we identify four different educational tracks according to types of schools entered as well as the highest educational attainment to date. In order to control the potential impact of educational attainment on depressive symptoms, comparisons are made among respondents with the same educational levels, but are in different educational tracks. In other words, the sample is divided into two categories according to the educational attainment, with each category comprised of two groups in different tracks. The first category will distinguish those with the highest degrees of vocational high schools versus those with high schools; and the second category pertains to those who continue to attend regular colleges versus technical colleges. We then conduct statistical analyses separately for each category to examine the impact of educational tracking on depressive symptoms.

As shown in Figure 1, changes of the mean depressive symptoms from age 13 to 20 exhibit a similar and non-linear pattern in all four educational tracks. The two peaks of mean depressive symptoms occur at age 15 and 18, corresponding to the year most respondents taking the entrance examination for high schools and college respectively.

Since it has been documented that the trajectory of depressive symptoms during adolescence has evident individual variation, the latent growth curve model is thus applied. The latent growth curve model will allow us to delineate various trajectories of depressive symptoms for adolescents in different educational tracks. It also examines the potential impact of family and school factors on the initial status as well as the growth rate of the depressive symptoms over time.

(Figure 1 about here)

Furthermore, since the time frame expands from early adolescence to young adulthood, we decided to test the quadratic as well as higher degree functions on growth rate so as to capture the curve-linear characteristics of the growth curve. We use HLM 6.04 software to estimate the latent growth curve model (software such as LISREL 8 does not allow the estimation of growth rate higher than quadratic function). As Raudenbush and Bryk (2002) indicate, as long as the time series is sufficiently long, a polynomial of any degree can be fitted and tested in hierarchical linear model. There are eight waves of observations for each respondent, hence it is not difficult to estimate the cubic or quartic functions of time. In addition, when the aim of a research is to collect certain observations per participant according to a fixed design, an unrestricted hierarchical multivariate linear model (HMLM) is appropriate for estimating individual changes (Raudenbush et al. 2004). With all participants in TYP being interviewed in all eight waves of survey, unrestricted HMLM to estimate the latent growth curve model of depressive symptoms is applied.

It should be noted that when estimating the latent growth curve model, the interpretation of coefficients pertaining to the quadratic or higher degree functions on the growth rate could be difficult. The growth rate at any particular time is the first derivative of the growth model evaluated at that time (Raudenbush and Bryk 2002: 171). That is, if we have variable of quadratic or higher degree of growth rate in the model, the growth rate would change as time proceeds. Although the complexity of model helps increase the precision of a predicting value on a specific time, it is however difficult to directly interpret the coefficients. For example, when a factor is significantly related to both the instantaneous growth rate as well as the quadratic and cubic function of growth rate, we cannot simply say that the factor is “positively (or negatively) related to” the dependent variable. It is even more difficult to interpret the coefficients of different degrees of function of growth rate which may have different signs (i.e., some are positive, and some are negative).

In latent growth curve model, the coefficients represent the relation between the predicting factors and the “initial status” or “growth rate” of the dependent variable, not the dependent variable itself. The significant coefficients obtained in the high degree functions of growth rate denote the degree of fluctuation of the trajectory

rather than the absolute predicted value. In this study, the general growth trajectory of depressive symptoms for Taiwanese adolescents displays two peaks during the observed eight-year period, Hence, regression coefficients examined will focus on how certain family and school factors associated with the initial status, the growth rate toward the first peak, the growth rate toward the second peak, and the overall degree of fluctuation of the trajectory for depressive symptoms.

V. Results

We will first examine the overall average depressive symptoms of four different educational tracks. Table 1 clearly points out that from age 13 to age 20, comparing adolescents with vocational high school education with their counterpart of high school attainment, the former group reveals consistently higher depressive symptoms as well as relatively more fluctuation for the eight years' period observed. On the contrary, for two groups with continuing education to college, the mean score indicates that those in the high school-college track tend to report more depressive symptoms than the vocational high school-(technical) college track. In fact, growth trajectories for the lower depressed group of both high school graduates and college students are almost identical, more variation is observed only after age 18. But the highest depressive symptoms are found for vocational high school graduates, who have shown generally higher depression than the high school-college track over the life course. The overall picture from the mean score is somewhat unexpected. Because the majority who enters the high school-college track has gone through two entrance examinations and was assumed to experience the most educational competition. Nevertheless, the vocational high school graduates who do not pursue further study in college have even higher average depressive symptoms. It is suspected that the demand of getting descent jobs as well as the social response present constant pressure for this group, more so than the expectation of educational performance imposed on college students.

(Table 1 about here)

With regard to explanatory variables investigated, Table 1 lists the means by four educational tracks. It should be pointed out that among all three family related factors, a hierarchical order by different tracks seems to exist. Specifically, the average score of family cohesion, physical provision and father's education progresses from vocational high having the lowest mean to high school, then to vocational high-college and to high school-college track having the highest mean. Similar pattern can be found for school related variables. The average score of classroom cohesion and academic performance also resembles the order by educational tracks delineated above. Inter-class competition shows only slight

reversal between the high school and vocational high-college groups; while teacher's unfair treatment is reported the most by vocational high graduates as expected. The result supports our contention that the educational tracking system in Taiwan is operated in a hierarchical fashion. For most adolescents who have at least the high school educational level, the vocational high school attainment is least favored and is also least resourceful in substance. The track of high school attainment closely follows in both family and school resources. Adolescents falling into the track of vocational high to technical college are relatively more resourceful than high school graduates. But it is the group who follows the desirable high school to college track tends to enjoy the most family and school resources.

Therefore, in the following analysis, we will first compare the two groups with high school level education and examine factors accounted for the growth trajectory of depression symptoms over the eight years' time period. Intra-individual variation motivates us to use the latent growth curve model in order to detect possible different growth trajectories over time.

Table 2 reports comparisons between vocational high school and high school graduates. Model 1 asserts the salience of high school tracking effect in that vocational high group expresses significantly different depressive symptoms from their high school counterpart. In addition to delineate growth curves at the initial status, growth to the first peak and to the second peak, fluctuation during the period is addressed according to its degree of consistency to the modal trend. Since depression at two peaks which corresponds to the timing of entrance examination is the main concern of this study, we will therefore focus on significant coefficients appear at the growth rate to two peaks (i.e., coefficients shown in the model for growth rate and the model for cubic function).

(Table 2 about here)

From Table 2, it can be seen that no difference appears at the initial stage, but **vocational high school** graduates are more likely to have higher depressive symptoms toward the first peak, and higher increase again toward the second peak, thus higher fluctuation is observed (see Figure 2). Regarding the gender effect, it is shown that **males** not only have lower depressive symptoms initially, they also exhibit lower increase rate to the first and second peaks, thus have lower fluctuation. Model 3 considers family variables and Model 4 includes both family and school variables. As can be seen, **family cohesion** does not reach significance at the initial status nor for the growth to the second peak, but it contributes to the first peak of depressive trajectory, hence only higher fluctuation by the first peak is attained. For **physical provision** as well as **father's education**, both variables start with lower effects initially, but greater provision at home and having higher educated fathers lead to

significant increase of depressive symptoms to the first and the second peak, clearly higher fluctuation can be stated.

With regard to the school context, for **class cohesion**, a consistently lower effect is ascertained in that more cohesive experience at school helps to reduce depressive symptoms at the initial status as well as during *the period of* growth to the first and to the second peak, lower fluctuation of trajectory is shown. In terms of **inter-class competition**, the effect is limited to the initial status in that better academic performance of the class contributes to better psychological well-being. In contrast, **unfair treatment of teachers** is found to enhance the depression symptoms reported, but the effect only appears at the initial stage. Surprisingly, the academic performance when analyzed with all relevant factors over the adolescent's life course loses expected significance. Perhaps for high school level graduates, the academic record has not been their strength and consequently, does not affect the growth trajectory of depressive symptoms in a significant manner.

(Figure 2 about here)

In brief, Table 2 points out that for high school graduates, the comparison between vocational high and high school groups, the former group reveals a more fluctuated trajectory and tends to experience more depressive symptoms when facing two entrance examinations (refer to the summary Table 2.1 below). Among possible factors accounted for the growth trajectory especially toward two peaks, physical provision in the family context as well as having higher educated fathers are likely to result in more depressive symptoms at the time of taking examinations and more fluctuated trajectory. Males and those report higher class cohesion experience during junior high tend to have less fluctuated trajectory and more likely to experience lower growth rate of depression over the life course. Since higher family cohesion perceived also contributes to the growth rate at the high school entrance examination, perhaps family resources correspond with family expectation, which in turn becomes source of pressure resulting in negative psychological well-being for adolescents.

(Table 2.1 about here)

Another noteworthy finding of the high school educated is that unfair treatment of teachers perceived at junior high only has detrimental influence at the beginning status, unlike the long-term effect documented in previous report (Yi et al forthcoming). This may be owing to not taken into consideration the different educational tracks existed in earlier analysis. It may also imply that for adolescents not engaged in further studies beyond the high school level, junior high teachers do not assume significant role that will produce long-term effects.

For the comparison between the majority adolescents who are either in the high school to college track (50%) or in the vocational high to college track (30%), different patterns are derived. It should be noted that same variables from the early family and school context are used to predict the mental health trajectory of these two groups. Table 3 points out that the **vocational educational track** (i.e., vocational high school to technical colleges) is significant in having lower depressive symptoms at the initial status only. As can be seen from Figure 3, the depression trajectory for college students in the vocational track appears to be the lowest among all at the beginning of junior high (in contrast with the highest depressive symptoms for the group of high school to college track). Nevertheless, college youth in the vocational track ends with the highest depressive symptoms over the observed period. But the change of growth rate does not attain significance in correspondence with two peaks.

(Table 3 and Figure 3 about here)

Male college students resemble their high school level counterpart exhibiting better mental health status from the initial status to two entrance examinations, and have lower fluctuated trajectory. With regard to the influence of family context on depressive growth, **family cohesion** tends to produce lower effect at the initial status, but becomes relatively higher as growth to the first peak is observed. **Physical provision** during the preparation for high school examination, however, is not as salient among the college group in that only more depressive symptoms are reported at the initial status. But **father's educational level** reveals opposite effects in comparison with the high school groups: having higher educated fathers is associated with higher depression initially, but it contributed to better mental health afterwards, and consequently a lower fluctuation is shown for college youth.

The contextual variables investigated for the school context also attain different effects for the college group. **Class cohesion** during junior high helps to alleviate mental health problems at the initial status, but it becomes significant in increasing the depressive symptoms to the first peak, and thus a higher fluctuation by the first peak is attained. Inter-class competition does not result in significant effects. **Unfair teachers** are shown to produce more depressive symptoms initially, but the effect is significantly lower as adolescents approach the first peak of high school examination. Perhaps the most interesting finding for the college group is the persistent effect of **academic performance** at the junior high school on the depressive growth. Better academic records are found to lead to significant increase of depressive symptoms to the first and the second peak, and a clearly higher fluctuated trajectory can be found.

Overall, the difference between college level groups and high school level groups with regard to mechanisms affecting the depressive trajectories is ascertained. Higher degrees of family cohesion and class cohesion, while producing opposing

effects for the high school level groups, are shown to increase more depressive symptoms when preparing for the high school entrance examination for college adolescents. Males and those with higher educated fathers, again opposing effects are indicated for the high school level groups, tend to produce similarly lower growth rate when facing two entrance examinations. As a consequence, a relatively more stable trajectory is observed when compared to the model trend. Other contextual variables, such as physical provision, exhibit different effects from the result of high school levels in that it decreases the psychological well-being for the college youth, and the effect is limited to the initial status only. But we suspect that the college group, unlike their high school level counterpart, may possess greater inherent educational competitiveness. Because the academic performance not only produces significant effect toward growth to the first and to the second peak, higher fluctuated trajectory probably due to the curve pertaining to the vocational track is also shown.

(Table 3.1 about here)

VI. Conclusion

This study is able to document the significant effect of educational tracking on the growth trajectory of individual psychological well-being in Taiwan. Specifically, adolescents at **vocational schools**, whether at the high school level or at the college level, are more likely to report more depressive symptoms than their counterparts in the regular educational track from early adolescence to young adulthood. However, compared with high school graduates, adolescents who enter colleges do not report better mental health because college students in the educational track of vocational training actually have the highest depressive symptoms during most of the eight years' period. In addition, adolescents who graduated from vocational high schools and are not studying for the college degree reveal fluctuated trajectory with clear peaks at the earlier stage and toward the end of the observation.

Since the time frame is set from early adolescence (or an average age of 13) to young adulthood (or an average age of 20), family and school context are considered most relevant fields affecting the developmental outcome of youth. Among structural and individual factors examined, early family and school influence are shown to be significant but decreasing in terms of strength of effect as time proceeds. The most salient mechanism with prolonged effect is the **family provision** during junior high schools. Among adolescents with *high school educational levels*, those who received special nutrition and designated study space when preparing for the high school examination reveal more depressive symptoms toward first peak as well as toward the second peak, and higher fluctuated trajectory is shown. But for college

students, earlier family experience only produces negative outcome at the initial status.

Within the school context, **class cohesion** demonstrates varying effects on college adolescents versus high school graduates. Among the latter, cohesive experience reported during junior high contributes to less depressive symptoms over time. It also results in less fluctuated trajectories in the course of two entrance examinations when holding constant other variables. In other words, positive school atmosphere as indicated by the cohesive classroom culture in early stage contributes to the psychological well-being of high school educated adolescents over time. But for adolescents in college, earlier classroom experience is much more restricted to the growth trajectory to the first peak only. Class cohesion helps student's school adjustment at the beginning, but it increases depressive symptoms when high school entrance examination approaches. It seems that the adolescents with high school educational level versus those studying in colleges are indeed two different groups.

Several possible reasons are suspected for the above findings. Firstly, regarding more mental health problems revealed by the **vocational track** in the educational system, less encouraging social response may be the fundamental cause. Unlike other undifferentiated secondary schooling system, Taiwanese adolescents enter the vocational track are often labeled *secondary* in academic performance. Compared with their counterparts who stay in the regular educational track, adolescents with vocational education perhaps face the expectation of finding descent jobs earlier. The demanding social response is especially acute for those with high school educational level who are not currently pursuing further studies in college. They are forced to confront the challenge of labor force participation at a relatively earlier stage. Being socialized in the Chinese cultural heritage, educational achievement is highly valued by all with little exception. The fact that 12% of vocational high graduates and 27% of high school graduates took the comprehensive test in our sample indicates that the college plan remains to be desirable for a substantial proportion of high school graduates. Even for those not actively planning for the college entrance, the opportunity to study in the college is still likely an endorsed value. Therefore, the frustration from the negative educational outcome in addition to the discouraging social response associated with less education and lower social status may account for the more depressive symptoms revealed by youth in the vocational track.

With regard to the implication of **physical provision** as an indigenous aspect of parental involvement at home, it actually can be interpreted as the educational aspiration from the family context. The caring and concern behind the physical

arrangement may be perceived as the source of psychological pressure for children. While receiving more attention and favors when the entrance examination approaches may appear as a privilege, the strong parental expectation conveyed through these practices may arouse negative psychological reactions simultaneously. For those who have high school education only, parental aspiration results in more depression in the face of two entrance examinations. The outcome of being unable to enter college may aggravate the pressure perceived in the family context. For the academically more successful adolescents who become college students, the effect of parental aspiration in the early family experience is limited to the higher depressive symptoms at the initial stage only. Having more educated or resourceful parent contributes to the better mental health trajectory revealed.

The overall growth trajectory among four educational tracking groups points out that college youth in the vocational track becomes the most depressed group, while high school graduates experience the least mental health problems and exhibit a less fluctuated trajectory. Nevertheless, toward the end of the observation, the high school graduates demonstrate a steep rise of depressive symptoms indicating the possibility of perceiving subsequent challenges into adulthood.

One last note: It is evident that using latent growth curve model allows us to detect intra-individual variation over time which turns out to be quite different from the pattern found by using average mean scores. Specifically, the average mean method shows that vocational high school graduates experience the most depressive development, and college students graduated from regular high schools closely follow. This becomes an ecological fallacy when comparing with the result from the latent growth curve model. Our analyses point out that the most depressed group from early adolescence to young adulthood in Taiwan is the college student in the vocational track; next is the vocational high school graduates with clearer fluctuated depressive trajectory. Since individual psychological well-being is a product of both personal performance in the educational system as well as social responses resulted from traditional values and contextual variants, further studies need to examine the effects of educational aspiration at the individual and at the family level. This proposal is especially pertinent for the Taiwanese setting due to its strong value on the educational attainment. Findings will shed light into potential impact that earlier experiences in the family and school context has on the developmental outcome of youth.

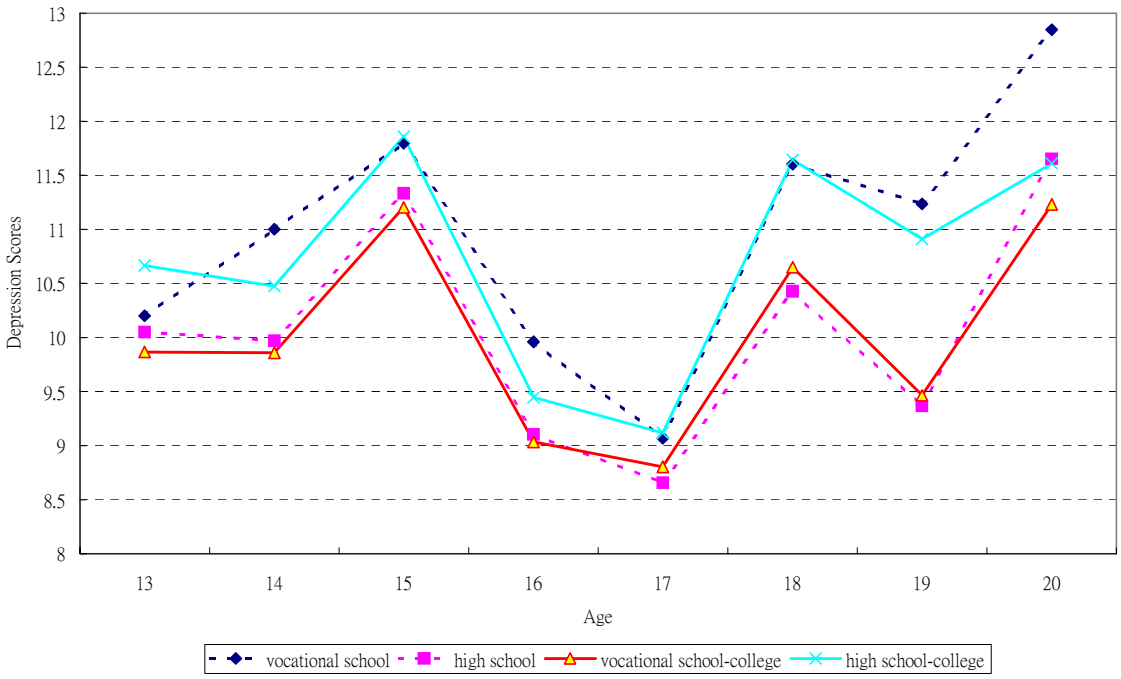

Figure 1. Mean depressive symptoms from age 13 to 20 by educational tracks

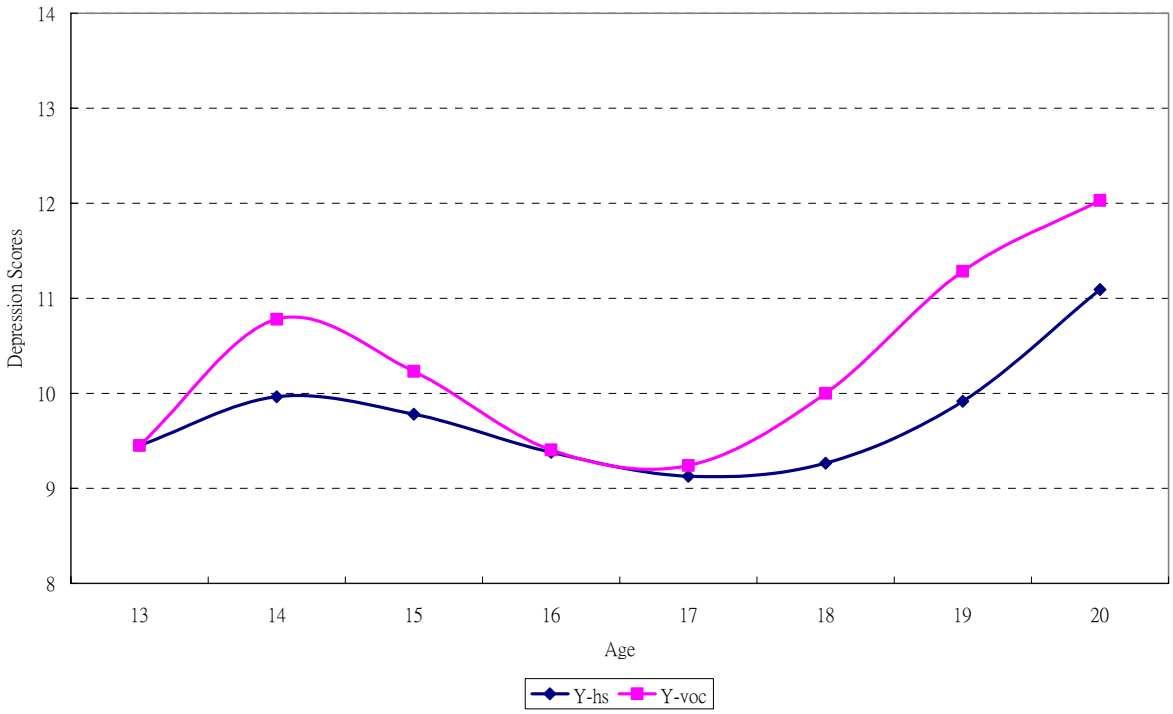

Figure 2. Estimated Trajectory of Depressive Symptoms for High School-Level Graduates

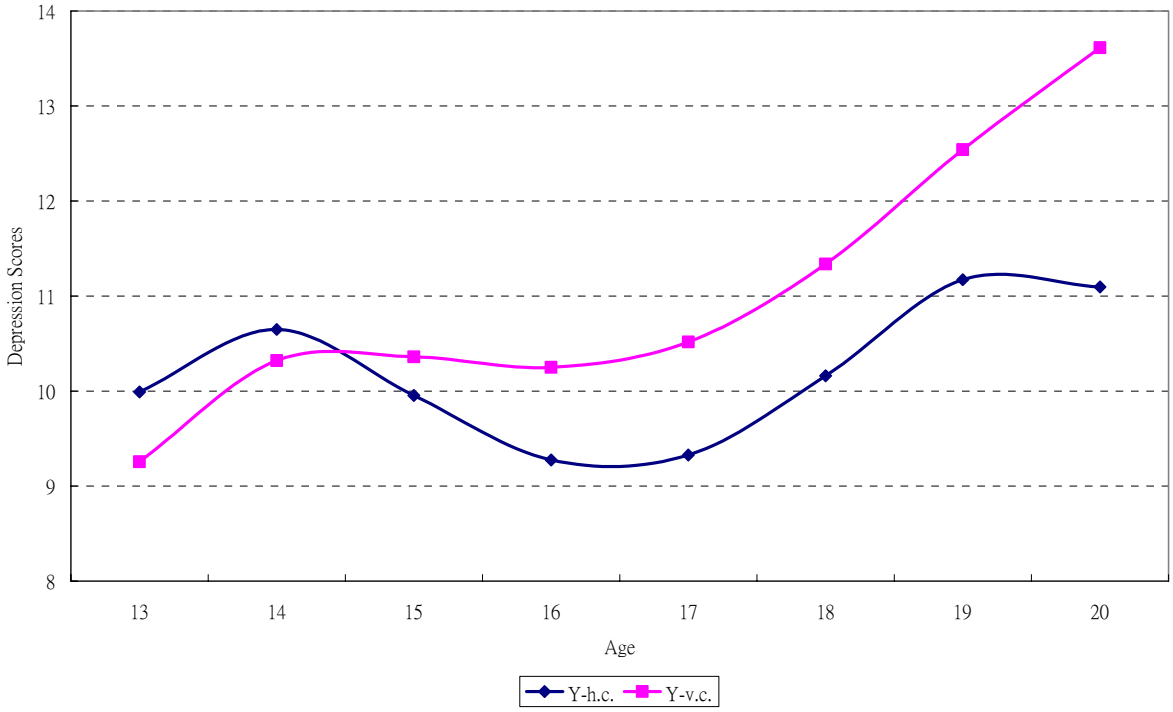

Figure 3. Estimated Trajectory of Depressive Symptoms for College-Level Students

Table 1. Means and Proportions for Family and School Characteristics and Depression Scores by Educational Tracks

Variables \ **Educational tracks**	VOC	HS	VOC-COL	HS-COL	Total
Male	.45	.54	.54	.48	.50
Family cohesion	11.03	11.19	11.45	11.87	11.60
Physical provision	0.91	0.94	0.99	1.30	1.13
Father's education (1=elementary school, 7=graduate school)	2.33	2.70	2.77	3.67	3.18
School class cohesion	8.60	8.95	8.96	9.03	8.97
Inter-class competition	2.79	2.87	2.84	2.89	2.86
Teacher's unfair treatment in class	2.05	1.92	1.99	1.99	1.99
Academic performance	2.53	2.59	2.95	4.03	3.41
Depression at wave 1	10.20	10.05	9.86	10.67	10.31
Depression at wave 2	11.00	9.97	9.86	10.48	10.27
Depression at wave 3	11.80	11.33	11.20	11.86	11.59
Depression at wave 4	9.96	9.10	9.03	9.44	9.32
Depression at wave 5	9.07	8.66	8.80	9.12	8.97
Depression at wave 6	11.61	10.43	10.65	11.64	11.20
Depression at wave 7	11.23	9.37	9.47	10.91	10.37
Depression at wave 8	12.85	11.65	11.23	11.61	11.60
N	85	135	330	545	1095
(%)	(7.8)	(12.3)	(30.1)	(49.8)	(100.0)

VOC: vocational school
HS: high school
VOC-COL: vocational school – college
HS-COL: high school - college

Table 2. Unrestricted Growth Curve Model of Depressive Symptoms for High School Level Graduates, Taiwan Youth Project, 2000 - 2008

Fixed effects	Model 1	Model 2	Model 3	Model 4
Model for initial status				
Intercept	9.45**	9.96**	13.70**	16.62**
Vocational School	0.22	0.13	-0.02	-0.30
Male		-0.94*	-0.71	-0.80†
Family cohesion			-0.24*	-0.13
Physical provision			-0.38*	-0.35*
Father's education			-0.29†	-0.34*
School class cohesion				-0.46**
Inter-class competition				-0.32*
Teacher's unfair treatment in class				0.60**
Model for growth rate				
Intercept	1.05†	2.23**	-0.76	2.71
Vocational School	1.92*	1.71†	1.88*	1.78†
Male		-2.23*	-2.29*	-2.29*
Family cohesion			0.11*	0.11*
Physical provision			1.02**	1.10**
Father's education			0.34†	0.34†
School class cohesion				-0.39*
Model for quadratic function of time				
Intercept	-0.64	-1.45**	-0.35	-1.79*
Vocational School	-1.40*	-1.26*	-1.33*	-1.30*
Male		1.53*	1.50*	1.51*
Family cohesion			-0.02**	-0.02**
Physical provision			-0.62*	-0.66**
Father's education			-0.13†	-0.13†
School class cohesion				0.16*
Model for cubic function of time				
Intercept	0.11	0.30*	0.15	0.29*
Vocational School	0.32*	0.29*	0.30*	0.30*
Male		-0.36*	-0.34*	-0.35*
Physical provision			0.13*	0.14*
Father's education			0.01†	0.01†
School class cohesion				-0.02*
Model for quartic function of time				
Intercept	-.005	-0.02*	-0.01	-0.01
Vocational School	-0.02*	-0.02*	-0.02*	-0.02*
Male		0.03*	0.02*	0.02*
Physical provision			-0.01*	-0.01*

† p<.10; * p<.05; ** p<.01;

Table 2.1. Summary of HMLM Findings for High School-Level Graduates

	Initial status	Growth to 1st peak	Growth to 2nd peak	Fluctuation
Vocational school	-.	higher	higher	higher
Male	lower	lower	lower	lower
Family cohesion	-.	higher	-	Higher by 1st peak
Physical provision	lower	higher	higher	higher
Father's education	lower	higher	higher	higher
Class cohesion	lower	lower	lower	lower
Inter-class competition	lower	-	-	-
Unfair treatment by teachers	higher	-	-	-
Academic performance	-	-	-	-

Table 3. Unrestricted Growth Curve Model of Depressive Symptoms for College Students, Taiwan Youth Project, 2000 - 2008

Fixed effects	Model 1	Model 2	Model 3	Model 4
Model for initial status				
Intercept	9.99**	10.45**	14.52**	16.43**
Vocational School - college	-0.73**	-0.69**	-0.65**	-0.69*
Male		-0.93**	-0.99**	-1.04**
Family cohesion			-0.41**	-0.29**
Physical provision			0.18*	0.13†
Father's education			0.16*	0.14*
School class cohesion				-0.47**
Teacher's unfair treatment in class				0.58**
Academic performance at junior high school				-0.01
Model for growth rate				
Intercept	1.96**	2.41**	1.93**	-1.83
Vocational School - college	-0.42	-0.37	-0.49	0.32
Male		-0.91*	-0.85*	-0.83†
Family cohesion			0.09**	0.05†
Physical provision			-0.03†	-0.02
Father's education			-0.15*	-0.15*
School class cohesion				0.16**
Teacher's unfair treatment in class				-0.11**
Academic performance at junior high school				0.73**
Model for quadratic function of time				
Intercept	-1.67**	-1.98**	-2.04**	0.08
Vocational School - college	0.55†	0.52†	0.58*	0.04
Male		0.62*	0.60*	0.59*
Family cohesion			-0.01**	-0.01†
Father's education			0.06*	0.06*
School class cohesion				-0.02**
Academic performance at junior high school				-0.49**
Model for cubic function of time				
Intercept	0.39**	0.47**	0.49**	0.05
Vocational School - college	-0.16*	-0.15*	-0.16*	-0.04
Male		-0.15*	-0.14*	-0.14*
Father's education			-0.01*	-0.01*
Academic performance at junior high school				0.11**
Model for quartic function of time				
Intercept	-0.03**	-0.03**	-0.03**	-0.002
Vocational School - college	0.01**	0.01*	0.01*	0.004
Male		0.01*	0.01*	0.01*
Academic performance at junior high school				-0.01*

† p<.10; * p<.05; ** p<.01;

Table 3.1. Summary of HMLM Findings for College Level Adolescents

	Initial status	Growth to 1st peak	Growth to 2nd peak	Fluctuation
Vocational school	lower	-	-	-
Male	lower	lower	lower	lower
Family cohesion	lower	higher	-	Higher by 1st peak
Physical provision	higher	-	-	-
Father's education	higher	lower	lower	lower
Class cohesion	lower	higher		Higher by 1st peak
Inter-class competition	-	-	-	-
Unfair treatment by teachers	higher	lower		
Academic performance	-	higher	higher	higher

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APPENDIX

For instance, the following HLM equations represent gender differences in the depression trajectory among adolescents who graduated from high schools or from vocational high schools and did not pursue further education:

$$Y = P0 + P1*(AGE) + P2*(AGE)^2 + P3*(AGE)^3 + P4*(AGE13)^4 + e$$

$$P0 = B00 + B01*(MALE)$$

$$P1 = B10 + B11*(MALE)$$

$$P2 = B20 + B21*(MALE)$$

$$P3 = B30 + B31*(MALE)$$

$$P4 = B40 + B41*(MALE)$$

Using the unrestricted HMLM for model estimation, the estimated values for the above coefficients are:

B00 = 10.008592 (p<.01)	B01 = -0.953827 (p<.05)
B10 = 3.018340 (p<.01)	B11 = -2.394337 (p<.05)
B20 = -2.056868 (p<.01)	B21 = 1.652253 (p<.01)
B30 = 0.442109 (p<.01)	B31 = -0.386933 (p<.01)
B40 = -0.028862 (p<.01)	B41 = 0.027984 (p<.01)

According to these coefficients, we may draw estimated trajectories for male and female with high school-level education (see Figure A). Figure 2 shows that, compared to females, males tend to have lower initial status and milder growth rate toward the first peak of depression trajectory. This pattern corresponds to the opposite signs between both B00 and B01, and B10 and B11. In addition, we can also observe that, after the first peak of depression, the depression trajectory for males tends to have a milder decreasing and milder increasing trend toward the second peak. This corresponds to the opposite signs between both B20 and B21, and B30 and B31. Accordingly, the “second peak” is not as obvious as the first one, but at the end of the period of our observation, both trajectories exhibit a tendency of mild decrease, although it is less pronounced for males. This corresponds to the opposite signs between B40 and B41. Looking at the whole trajectory (and from the estimated coefficients), we can also conclude that males have a relatively more stable growth curve of depression than do women. In other words, females tend to be more responsive to factors leading to two peaks, and have a more fluctuated growth curve.

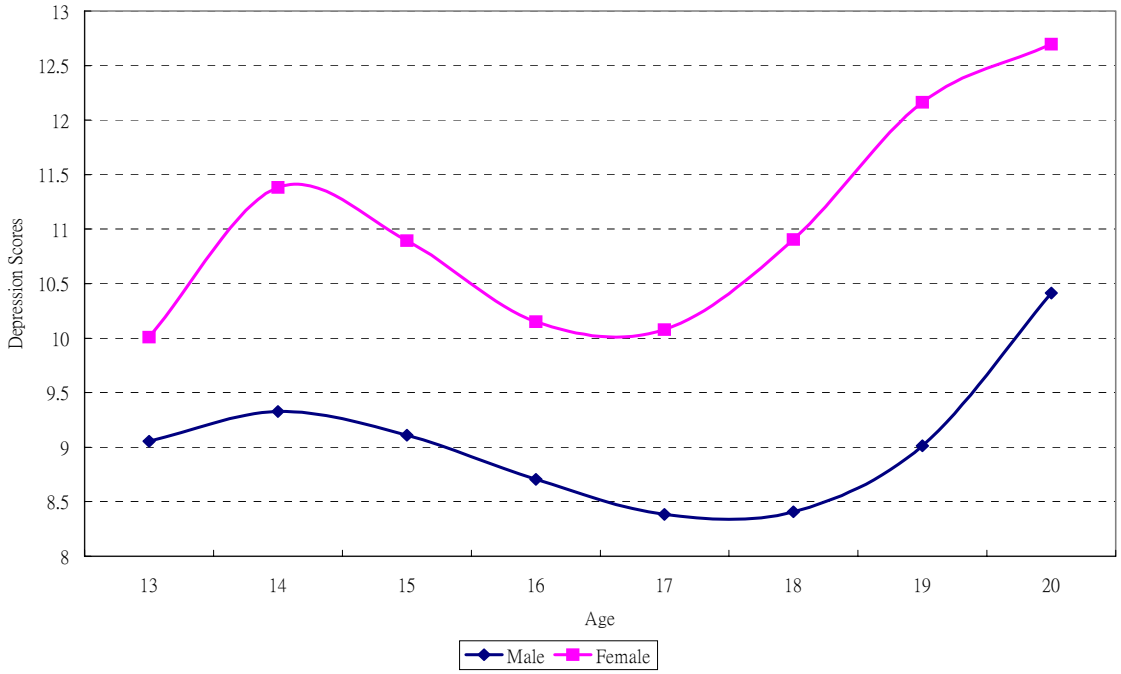

Figure A. Gender differences in depressive scores among high school-level graduates