THE DYNAMIC RELATIONSHIPS BETWEEN PARENTING AND ADOLESCENT DELINQUENCY: A GROUP-BASED MODEL APPROACH*

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ABSTRACT

Parenting has been found as a key factor for influencing adolescent delinquency. Past studies have shown that adolescents who expose to higher level of warmth, induction, and monitoring parenting would less likely be delinquents. However, most of these studies present the relationship between parenting and adolescent delinquency statically. That is, researchers show parenting measured at one time predicts adolescent delinquency at the same time or the other time. Researchers seldom demonstrate whether the change of parenting over time influences the change of adolescent delinquency.

Theories of types of delinquents propose two types of delinquents in offender population (Patterson et al., 1992; Moffitt, 1993, 1997). Early starters show their delinquency in late childhood and persist into adulthood, while late starters show the

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behavior during mid-adolescence and desist after this period. Although researchers propose several predictions for distinguish types of delinquents and for explaining their developmental trajectories, parenting is the key factor among them. In predictor analysis, ineffective parenting in late childhood interacts with child's early temperament problems producing early starters. Several studies have demonstrated this argument (Fergusson et al., 2000; Nagin and Land, 1993; Wiesner and Silbereisen, 2003). In within delinquent group analysis, parenting has long been demonstrated its impact on adolescent delinquency (Lin, 2002). However, there is no research that systematically explores the relationship between parenting and delinquency over time under types of delinquents framework. In this study, we ask: How the change of parenting influences delinquent trajectories over time? Is there difference between different types of delinquents?

Using 5-year panel data of adolescents in Taiwan, current study started from types of delinquents argument and provided a group-based model to distinguish groups of delinquents. Based on the delinquent groups, we presented a time-varying model for exploring the dynamic relationship between parenting and delinquent trajectories. The results showed two offender groups in the sample and correspond to theories of types of delinquents. We also found the dynamic effect of parenting over time when predicting delinquent trajectories. The parenting showed its prominent effect for late starters in the later waves, while for early starters parenting had intervention effect at every time point.

Key words: types of delinquents, group-based model, time-varying covariates, parenting

Parenting has been found as a key factor for adolescent delinquency. Past studies have shown that adolescents who expose to higher level of warmth, induction, and monitoring parenting would be less likely to be delinquents. However, most of these studies present the relationship between parenting and adolescent delinquency statically. That is, researchers show parenting measured at one time predicts adolescent delinquency at the same time or the other time. Researchers seldom demonstrate whether the change of parenting over time influences the change of adolescent delinquency.

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In this study, we ask two questions: 1. How many types of delinquents in a Taiwan sample? 2. How the change of parenting influences delinquent trajectories over time? To achieve these aims, the current study used a longitudinal data set in Taiwan. We used PROC TRAJ, developed by Jones and Nagin (2001) to explore types of delinquents in four waves of the data

in Taiwan. PROC TRAJ also provided options to incorporate time-varying variables (i.e. parenting) to predict delinquent trajectories over time. Therefore, we can explore the dynamic relationships between parenting and delinquency over time with the program's capacity. The results should add to the existing literature and help us understand types of delinquency and its related covariates.

Literature Review

Both Godfredson & Hirshi's book (1990) and developmental perspectives showed a one-peak curve of prevalence of offending over life course. The prevalence of offending reaches its peak during mid-adolescence and declines when entering adulthood. Two themes have emerged regarding this one-peak curve. The continuity argument stated that some delinquents become criminals later, since these people consistently engage in delinquent behavior over time in this one-peak curve. The discontinuity argument explained the reasons that make the decline of this one-peak curve after period of adolescence.

Basically, researchers have reached consensus about the continuity of delinquent and criminal behavior over life course. As Nagin and Paternoster (1991) and Sampson and Laub (1992) indicated, the link between early antisocial behavior and later criminal offending is the prominent findings across studies. Based on arrest data and statistics, Blumstein's research (1986) showed there is a small group of offenders who keep their criminal career for a long time. These people although account for only 5% of offender population commit 80% of the total offending. These findings showed the importance of tracing the early experience of offenders. Therefore, for studying the continuity of offending history, longitudinal data from childhood to adulthood are required.

Types of Delinquents

Since the consensus of the continuity, the discontinuity of delinquent and criminal behaviors became the next theme in developmental research. Robins (1978), Loeber and LeBlanc (1990), and Sampson and Laub (1992) indicated that not all adolescent delinquents become criminals in their later life. This leads researchers to ask: Who will keep their delinquency over time? Who will drop out in the later time?

Theories of types of delinquency provided the answer: the continuity and drop-outs are different types of delinquents. Patterson and Moffitt both developed theories of two types of delinquents to describe the heterogeneity in the offender population over the life course. Patterson and his colleagues (Patterson et al., 1989; Patterson, Reid and Dishion, 1992; Patterson and Yoerger, 1993) used early and late starters, while Moffitt (1993, 1997) used life-course-persistent and adolescent-limited delinquents. Patterson and his colleagues proposed a sequence of causal relationships (a coercive model) among child's antisocial behavior, parenting practices and peer variables. Late starters start their deviant behaviors during mid- to late adolescence. Most of these behaviors are considered to be the consequence of peer encouragement or peer pressure as well as inept parenting (Patterson et al., 1992). Moffitt used adolescent-limited delinquents to describe these delinquents. For Moffitt, the delinquent behaviors are the result of psychological tensions and social mimicry. Because of modernization, young people reach physical maturation during adolescence. Adolescents desire to be treated as adults and be autonomous, since they feel they are "adults". However, social norms do not give them the rights they desire and consequently adolescents experience the tensions between the desire for autonomy and lack of power. The desire to reduce this tension leads some adolescents to mimic the behavior of their delinquent peers (Moffitt, 1997).

In their coercive model, Patterson et al. (1992) also indicated that early

starters tend to experience ineffective parenting in childhood and peer rejection during adolescence. Early starters begin their deviant career during late childhood. The dynamic interaction between parents and children is the key to the coercive model. The coercive process shows that if parents use ineffective parenting, such as lack of monitoring and warmth, harsh parenting, or inconsistent parenting, their difficult children would react with more deviant behaviors. The failure in parenting impairs parental psychological functioning, which in turn induces even less effective parenting (DeGarmo et al., 2004). Patterson et al. (1993) also argued that children would experience peer rejection when entering adolescence. Early starters face peer rejection in adolescence due to their antisocial behaviors. This encourages them, if they do not want to be isolated, to make friends with other deviant kids. Therefore, during adolescence, early starters become isolated from conventional associations and tend to relate to deviant peers.

Moffitt (1993) used life-course-persistent delinquents to describe early starters. In her theory, there exists a small group of people who show their delinquent behaviors early and maintain them over time. As Moffitt (1997) put, these people tend to have deficits in neuropsychological functioning, which refer to the disorder of the anatomical structures and physiological processes of the nervous system. With this defiant physiology, children may be clumsy and awkward, overactive, inattentive, irritable, impulsive, hard to keep on schedule, poor at verbal comprehension, deficient at expressing themselves, or slow at learning new things (p.18). These handicaps result in poor social skills. When interacting with social and family environment (such as poor parenting practice, family break-down, and poverty), these characteristics induce antisocial behaviors. Therefore, as Nagin and Tremblay (1999) showed those who are physical aggressive, oppositional, or hyperactive may follow the pathway into a delinquent career. Due to a lack of social skills, they find it difficult to do well in school, find a good

job, and keep conventional relationships with others. Therefore, life-course-persistent delinquents have longer and persistent criminal careers than the adolescent-limiteds.

Theory of Parenting

As we have seen, parenting practice plays a central role both in Moffitt's and Patterson's theories. This calls for a brief review of theory on parenting and delinquency. The most common-cited theory of parenting today is Baumrind's theory of authoritative parenting. She proposed four types of parenting styles based upon two dimensions: demandingness and responsiveness. As she indicated:

Responsiveness refers to the extent to which parents intentionally foster individuality and self-assertion by being attuned, supportive, and acquiescent to children's needs and demands. Demandingness refers to the claims parents make on children to become integrated into the family and community by their maturity expectations, supervision, disciplinary efforts, and willingness to confront a disputative child (Baumrind, 1996).

Important facets of responsiveness include warmth, reciprocity, clear communication, person-centered discourse, and attachment. Warmth in parents motivates children to participate in cooperative strategies and is associated with the development in children of an internalized moral orientation. Person-centered parental communication legitimizes parental authority by persuasion and, therefore, tends to be better accepted by the child. Parents who provide explanations will help children, especially adolescents, to internalize values more effectively.

The second major factor of parenting, demandingness, includes direct confrontations, monitoring, and consistent, contingent discipline. Ineffective monitoring, which is the focus of Gottfredson and Hirshi's argument about construction of low self-control has been related to

children's conduct problems (Patterson and Stouthamer-Loeber, 1984; Sampson and Laub, 1994). The contingent use of positive or negative reinforcers immediately following desired or prohibited child behavior is a crucial factor in behavior management. A non-contingent use of discipline tends to be related to deficit in children.

Baumrind referred to parents who are demanding and responsive as authoritative parents. Their children are expected to perform better in social competence than are children whose parents are authoritarian (demanding but not responsive), permissive (responsive but not demanding), or rejecting-neglecting (neither demanding nor responsive). Researchers have reported the effect of authoritative parenting on various child and adolescent outcomes, including conduct problems, substance use, and depression (Ge et al., 1996; Brody et al., 2001; Brody et al., 2004).

While authoritative parenting equates to positive parenting, harsh parenting would represent the negative parenting. Research has shown the negative effect of harsh or corporal punishment on child and adolescent outcomes (Simons et al., 2000; Chung et al., 2002a, 2002b). With the third wave of the data used in this study, Lin (2002) found the parenting measures worked for predicting delinquency and depression in her SEM models. Harsh parenting is especially important for the current study. Although Taiwan has experienced Westernization since the 1980's, harsh and corporal punishment is still commonly accepted in the society. Whether or not the effect of harsh parenting measured at early age can work like what theory predicts is an empirical question for the current study. Besides, like theory of parenting, theories of types of delinquents proposed that positive and negative parenting influences the development of delinquency over life course. Therefore, the current study included positive and negative parenting as covariates for delinquent trajectories. Furthermore, past studies of the effect of parenting on delinquency only presented a snap shot. That is,

researchers used parenting measures at one time to predict delinquency at the same time or at other time. From developmental perspectives, it is more relevant to ask how change of positive and negative parenting over a period of time influences the change of the developmental trajectories of delinquency. Using PROC TRAJ, the current study incorporated parenting as a time-varying covariate in the models to understand the dynamic relationship between parenting and delinquency.

Empirical Studies in Taiwan

We only found one study that investigated types of delinquents using a sample from a non-Western country. Tzeng (2001) studied the 'one-peak' curve of prevalence of criminals over the life course in Taiwan. First, she showed that the official crime data in Taiwan confirmed the 'one-peak' curve argument as would be predicted by self-control theory, showing an increase of offending during mid-adolescence and a decrease after entering adulthood. Second, she investigated types of delinquents among a high school student sample (age 16 to 18) based on self-report delinquent behavior. She distinguished early starters and late starters in this sample by a cut-off of offending prior to age 12 and profiled them for childhood conduct disorder, temperament problems, and low self-control variables. However, although the results confirmed several hypotheses that both Moffitt and Patterson made, the data she used was retrospective and cross-sectional. As Moffitt (1997) emphasized life-course-persistent and adolescence-limited delinquents should be defined on the basis of their natural histories of delinquent behaviors, so cross-sectional data cannot be considered a valid way to identify types of delinquents. In particular, retrospective data are vulnerable to memory bias (Scott and Alwin, 1998); therefore, prospective longitudinal data are required.

The relatively low crime rate reported in the official statistics in Asian countries makes the investigation of number of types of delinquents more

challenging. In 2004, Uniform Crime report in US reported 3,983 convictions per 100,000 persons. In Europe, the UK 2005 Yearbook report 11,300 convictions per 100,000 in 2003/04 and Oberwittler et al. (2005) reported around 8,000 convictions per 100,000 in Germany. However, compared to the crime rates reported above, Taiwan 2005 Yearbook reported 2,193 convictions per 100,000 in 2003 and Japan 2005 Yearbook reported 2,856 convictions in the same year. The rate in South Korea was even lower than these two countries (1,674 in 2002 from 2005 South Korea Yearbook). Given the low crime rate in these countries, do data from a Non-Western county show similar pattern in the number of types of delinquents?

For the current study, it will be interesting to ask whether delinquent types found using Western samples will be replicated in a non-Western sample. Further, the progression of offender's behaviors across several time points is also a comparison of interest. This study provided an assessment as to the generalizability of Patterson and Moffitt's theory to a non-Western country using prospective longitudinal data colleted from Taiwan. The results can be compared to the offender groups identified in the existing literature.

The effect of parenting as covariates of delinquency has gained support in several studies in Taiwan. Wu and his colleagues presented a series of studies about the influence of family impact on adolescent delinquency (Kao et al., 1998; Wu, 2000; Jou and Wu, 2001; Wu and Lei, 2004). They found supportive evidence about the impact of both positive parenting (warmth and control) and negative parenting (harsh parenting) on adolescent delinquency across studies by using the first three waves of the data used in the current study. Using wave 3 of the data, Lin (2002) compared the influence of parenting on depression and delinquency across Taiwan and US samples. The results showed similar patterns for the impact

of parenting across nations. Studies using other data sets also supported the effect of parenting on various adolescent outcomes (Chen, 2000; Wu, 1998).

Wu (1999) investigated the influence of parents and peers in adolescent behavior during early adolescence. Her study showed that peers had more impact than parents on delinquency, but not on academic performance. Lo (1998) also presented a model that employed careful measurement of deviant peers, parenting, and the outcome variables. He found that deviant affiliation was an important factor for explaining adolescent behavior after controlling for parenting.

Although studies using Taiwanese samples showed consistent evidence for the importance of parenting as a covariate of delinquency, we still know little about how parenting influences the trajectory of delinquency over time. Furthermore, how does the association between parenting and delinquency differ for different types of delinquent? Therefore, we presented a time-varying covariate analysis with a more comprehensive and dynamic perspective under types of delinquents framework.

Methods and Measures

Population and Sample

Data

Data are from a panel study in a big city in Taiwan since 1996, titled "The Etiology of Adolescent's Substance Abuse: A Social Learning Model." This research was conducted by the second author and was founded by National Health Research Institute in Taiwan for first three waves (DOH86-HR-621, DOH87-HR-621, DOH88-HR-621). After that,

the research was funded by the Institute of Sociology in Academia Sinica. Currently, this panel study is on its 9th wave data collection.

The population is 13-years teenagers in the city in 1996. Since the enrollment rate in junior high school for this age group is close to 99.9%, it is appropriate to use all junior high school students in the city as a sampling frame. Using two-stage cluster sampling in twelve administrative areas of the city, researchers first randomly chose two or three junior high schools in each area (based on how big the area is) and randomly selected one or two classes in 7th grade in each school. When the class was selected, all of the students in that class were included in the sample.

Procedures

From September to November in 1996, the investigator sent trained interviewers to each selected class. Students filled out the questionnaire in class within 2 hours with interviewers' assistance if necessary. There were 1,434 junior high school students in the first wave. When visiting the sample class, interviewers also distributed teacher questionnaires to the teacher of that class. Each teacher should fill out a 3-page questionnaire for each student in his/her class and returned them in three months. Due to rejection of cooperation from one teacher, there were 1,394 teacher questionnaires collected in wave one. After finishing data collection for students and teachers, the researcher sent trained interviewers to sample student's family to collect primary caregiver's data (most of them are mothers). The interview took about two hours at their home and a small gift was delivered after the interview. There were 1,109 primary caregivers in the first wave. Wave two and three student data were conducted by the same procedures through 1997 and 1999. There are some new students who transferred into sampled classes in wave 2 and wave 3. They were included in later investigation, too. Due to student's moving in or out of class, the third wave contained 1,449 students and teacher's questionnaires (about

94.4% appearing across three waves), and 1,243 primary caregivers (85% appearing across three waves).

Because of the graduation from the original schools into senior high schools, in wave four researchers used phone interview to gather student's data from late 1999 to early 2000. Around 86% of students in original sample were contacted. In February 2001, researchers conducted home visit for the fifth wave investigation. Researchers sent two trained interviewers to student's home and interviewed both student and his/her primary caregiver. 1094 students were interviewed and about 80% of original sample participated in all five investigations. After listwise deletion for missing data in the research variables, the final cases used in this study are 923. There are 476 boys and 447 girls. Because of the missing data, the current research only retains 64% of original sample across five years. The program we used to conduct the group-based model (Proc TRAJ) provides a missing data imputation option via EM algorithm. In the preliminary analysis, we first ran the model with listwise deletion and then ran the model with the missing data imputation. The results are similar in terms of number of groups and estimated parameters (trajectory shapes). Therefore, in the following analyses, we will present the model with listwise deletion. Because of absence of some measures in the fourth wave, the current study used only 1, 2, 3, and 5 waves of the data.

Measures

Delinquency

We got the delinquency measures from student questionnaire. The self-report delinquency inventory adapted from the National Youth Survey was used (Elliott and Menard, 1996; Elliott and Morse, 1989). There were 23 items in the original questionnaire. However, due to saving the space of questionnaire, in wave 5, researchers reduced this scale and used five items

to measure adolescent self-reported delinquency. They asked respondents: "Did you have the following behavior during past year?" The items are typical delinquent behaviors for adolescents in Taiwan including running away, skipping school, stealing, beating others, and speeding motorcycles. Respondents reported 0 as not committed and 1 as yes. We summed the scores of the five items and gained the mean score for each respondent. For the group-based model, it is better to use the same delinquency measure across waves, so we used the same items to create the delinquency measure for the rest of waves. In the group-based model analysis, we used the self-reported delinquency when respondents are 13, 14, 15, and 17 years old.

Affiliation with deviant peers

Students reported their friends' behavior with a similar checklist as in the delinquency inventory. There are 8 items used in this analysis. The question asked: In the past year, among your good friends, how many of them have done the following behaviors? It included running away from home or school, destroying things that do not belong to him/her, stealing, speeding, fighting, smoking, and drinking. The response format was 1 (none of them) to 4 (all of them). We summed them together and calculated the mean score for each student. The reliability is .77, .90, .92, and .84 across waves.

Parenting measures

There were two dimensions in parenting measures: involved vigilant (authoritative) parenting and harsh parenting. We used both student and parental report. The response format was 1 (never) through 4 (always). There were six items in involved vigilant parenting over 4 waves including monitoring and inductive reasoning. There were three items measuring harsh parenting across four waves. Students reported the parenting

behaviors for their fathers and mothers. We first summed the items and got the involved vigilant and harsh parenting scores for mothers and fathers. After that we summed the two scores together and calculated the parenting scores from students' report. We also summed the parental report items and calculated the scores for each parenting dimension. In the final step, we calculated the mean scores between student and parental report for each parenting dimension and these were the variables we used in the following analyses.

Analytic Strategy

Nagin and his colleagues developed a systematic procedure to analyze the delinquent trajectories (Nagin and Land, 1993; Nagin, 1999; Jones et al., 2001). Nagin (1999) and Jones et al. (2001) developed a summary of group-based models including statistical background (formulas and equations) and the statistical software. They also developed a set of systematic procedures for analyzing the questions of the number of groups and their covariates. The advantage of this approach is that it provides a formal basis for determining the number of groups that best fit the data and also provides an explicit metric, the posterior probability of group membership, for evaluating the precision of group assignments (Nagin, 1999). In addition, the software (i.e. PROC TRAJ) they developed provides coherent options not only for identifying the hidden trajectory groups, but also for incorporating both time-invariant and time-varying covariates in the analysis.

We did the analyses for boys only, since literature have had clear prediction about the patterns of male offenders. First, we presented the group-based model for the delinquent trajectories for boys. In this part of analyses, detecting the trajectory groups was to confirm the theory of types of delinquents proposed above. Second, we investigated the relationships between parenting and delinquency with profile analysis for the trajectory

groups. As Muthén (2004) indicated if the theoretical predictors cannot predict the group membership, the results from mixture models (group-based models) cannot be trusted. Therefore, the profile analyses presented a confirmation of the results with theory (Muthén, 2004). It also provided preliminary hints for effects of parenting. The last analysis was to investigate the dynamic relationships between delinquent trajectories and parenting across time. We investigated the relationships using time-varying covariate analysis, which was built in PROC TRAJ.

Results

Group-based Model for Delinquent Trajectories

We used PROC TRAJ (Jones et al., 2001) to estimate the group-based models. D'Unger et al. (1998) suggested a two-stage procedure to select the optimal model. At the first stage, we fitted the same shape of trajectory across groups as the baseline model. Since the result from latent growth model showed best fit for a model with quadratic term, we fitted the delinquency as a quadratic form of time. We used BICs of models as an index to find the best fit model. Nagin and Land (1993) indicated the problem of comparing BICs between two models in group-based models, since k-1 groups are not necessarily the nested model of k groups solution. Following the suggestion of Karney and Bradbury (1995) and Raftery (1995), if a BIC difference between two models is greater than 6, there is strong evidence for the difference between two models. For boys' model, we found that 3-group model fits the data best (BIC = -1251.97) when comparing with 2-group model (BIC = -1271.98711) and 4-group model (BIC = -1262.9187).

In the second stage, we allowed the shapes of the trajectories to be different across groups. In this stage the model selection process was very

time consuming. PROC TRAJ allows us to fit the cubic relationship between time and the outcomes at most. Therefore, we could have four choices of the shape for each group (i.e. flat line, linear, quadratic, and cubic). For a three-group model, there were 34 (81) possibilities to try. The strategy we used here is that we fitted the model as parsimonious as possible. If the linear form can fit the data as well as the quadratic form in terms of BICs, then we chose the linear form.

For boys, one flat line and two curved lines were presented. Figure 1 presented the predicted mean of delinquency for each group over time. The intercept of the flat line was not significant indicating that this group had zero mean delinquency over time. The intercept, slope, and quadratic terms of the two curved lines in the figure were all significant. We also estimated the proportion for each trajectory group. 34.13% of boys in this sample showed no delinquency over five years, so we named the group as 'never'. We had two offending groups. 55.73% of boys had low delinquency before age 15, but had a jump after that. This corresponds to the late starters in Patterson's theory, so we named them as 'late starters'. 10.14% of boys increased their delinquency after age 13. This group corresponds to the 'early starters' in Patterson's theory. Interestingly enough, both Patterson and Moffitt predicted that early starters are around 5 to 10 percent in the male population. Here we see the correspondence between the data and their theories.

In sum, the results from our group-based model surprised us since for boys the groups were just like what Patterson and Moffitt predicted. The current data showed fewer groups than all the studies in Western countries. The size of 'early starters' was larger than what theory expected and the results from previous studies. This could be because most of the delinquency measures were minor offending, while previous studies used

criminal offenses[1]. The 'late starters' group consisted of over half of the boys in the sample. Moffitt (1997) indicated that the late starters could be treated as 'normal' during mid-adolescence period, since they are commonly seen and almost every adolescent could commit some level of delinquency. From this perspective the size of 'late starters' group shown here is reasonable.

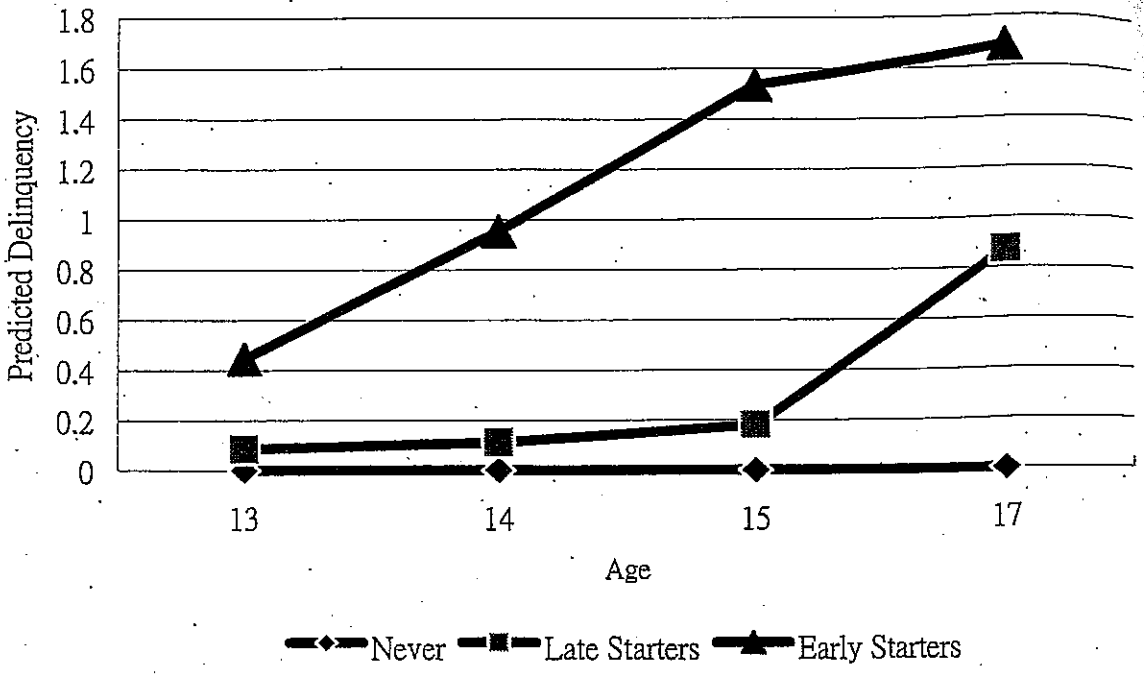


Figure 1. Trajectory Groups of Delinquency for Boys

[1] The authors agree the comment made by the reviewer that the delinquent acts used in this study is more like mild rebellious rather than violent or aggression delinquency. This was the reason that we used the term 'early starters' rather than 'life-course-persistent delinquents' in the current study. For us, the 'early starters' may not become persistent criminals, but only started the rebellious behaviors earlier than the 'late starters' due to puberty rebellion under the suppressive and authoritarian environment of Taiwanese school system. The current study did not rule out the possibility that both delinquent groups we found were actually 'adolescent-limited delinquents' in Moffitt's theory. However, without delinquency data after 17 years old, we left this question for future studies.

Parenting Profile for the Delinquent Trajectory Groups

We started our discussion of the relationship between parenting and the trajectory groups from the profile analysis. Table 1 presented means of parenting and deviant peer measures for developmental groups. The first set of variables was measured at the first wave of data collection (age 13). The second set of variables was created by averaging the variables across waves. The initial level of the three theoretically important variables answered the questions of how early parenting and delinquent peers associated with delinquent trajectory groups, while the time-averaging variables showed the cross-time effect of the parenting and delinquent peers on group membership.

Table 1. Descriptive Statistics (Means) by Trajectory Groups

Variables	Never	Late starter	Early starter
Early variables			
Affiliation with Deviant peers	6.53	6.89	7.58
Harsh parenting	3.78	3.89	4.24
Involved vigilant parenting	8.29	7.59	7.58
Averaging across waves			
Affiliation with Deviant peers	7.54	8.49	9.94
Harsh parenting	5.96	6.56	7.54
Involved vigilant parenting	13.94	12.48	12.13

In table 1, we can see early starters had highest scores on delinquent peers and harsh parenting and lowest score in involved vigilant parenting. Corresponding to Patterson's coercive theory and Moffitt's neuropsychological functioning argument, early starters experience higher harsh parenting and less positive parenting practices. The high level of affiliation with deviant peers also corresponded to Patterson and Moffitt's argument that early starters inclined to associate with deviant peers due to

their delinquency and peer rejection.

The late starters experienced a similar level of positive parenting; however, they experienced less harsh parenting and they affiliated with fewer deviant peers than early starters at this early period. These may be the reasons that they did not have high level of delinquency in the early stage of life course.

We now moved on to time-averaged variables. The results were similar to those shown above. Early starters still experienced a high level of time-averaged harsh parenting and delinquent peers, although the difference seems trivial. However, late and early starters had similar level of involved vigilant parenting. In general, we barely saw a distinction between late and early starters in these time-averaged variables. This corresponded to theories of types of delinquents that during the age range of current data (early to mid-adolescence) it is hard to distinguish early and late starters via these theoretical variables. As Moffitt indicated, the outburst of offending in this period is inevitable for late starters and they would mix with early starters. This may be why the time-averaged variables did not serve to be as powerful discriminators as early variables were.

We should note that here we just present the mean levels of these time-averaged variables. There were drawbacks to present mean level comparison. First, we can only capture the pooled relationships at variable level, but not at individual level. By using time-averaged variables, we overlooked the rich information of the multiple-wave design of the current data. Besides, we can only observe the relationships in univariate level. PROC TRAJ provided options for analyzing the relationships among variables dynamically and in multivariate context. Therefore, we moved to the time-varying covariate analysis.

Time-varying Covariate Analysis

The purpose of time-varying covariates was to investigate change in the dependent variable as a function of change in its covariates over time. Therefore, researchers can understand the dynamic relationships among covariates from the longitudinal perspectives. There are many ways to do time-varying analysis. They include cross-lagged panel analysis, time-varying covariates in latent growth models and growth curve models, a multiple group approach in SEM, autoregressive latent trajectory (ALT) models, or a parallel process of latent growth models (Curran et al., 1999; Muthén, 2004; Wickrama et al., 2002; Wills and Stoolmiller, 2002; Bollen and Curran, 2004). Each approach has its own conceptualization of the covariates over time. The current analysis utilized a group-based model in which the time-varying covariates were modeled as predictors along with the time variable in a time-specific equation. Since our goal was to investigate the relationships between parenting and delinquency, we included two parenting measures in the time-varying covariates as x's in the equation: ln (it) = 0 + Xi + 1 timeit + 2 time2it + i where Xi is the covariate(s) of interest. Besides, we also included affiliation with deviant peers as a third covariate for controlling purpose. PROC TRAJ provides an option for putting time-varying covariates in the model. It also provides an option that is used to observe change of trajectories based on hypothetic values of the time-varying covariates. The analysis provides a dynamic picture of how these time-varying covariates alter the developmental trajectory within a group over time. The results provide rich information about how change of parenting over time relates to change of delinquent trajectories.

Table 2 presented the results. We ran four models in this analysis. First, we ran three models with only one covariate at a time. Then, we ran the fourth model with three covariates in the same model. Since there was no

use in predicting the trajectory of the never group, we only presented early and late starters in the table. Model 1 through 3 showed that all the covariates significantly predicted the developmental trajectories of delinquency. We can observe in model 2 after adding time-varying involved vigilant parenting, that the time effects became non-significant. This showed that positive parenting had a significantly strong effect in predicting the developmental trajectory for early starters over the time effect. That is, the trajectory cannot be attributed only to time. In model 4 after adding all the covariates, we still saw that each covariate had significant effect on predicting the developmental trajectory and they operated in the predicted direction. That is, the positive coefficients increased the predicted mean of delinquency, while the negative coefficients decreased it.

Table 2. Time-varying Analyses for Boys' Delinquency Trajectories (Standard Errors in Parenthesis)

	Model 1		Model 2		Model 3		Model 4	
	Early Starters	Late Starters	Early Starters	Late Starter	Early Starters	Late Starters	Early Starters	Late Starters
Intercept	-28.15*	37.36**	-28.87*	22.24*	-19.15	32.97**	-17.30	43.57**
	(13.32)	(11.85)	(12.75)	(10.76)	(12.07)	(12.43)	(14.06)	(12.79)
Slope	36.34*	-58.45**	36.69*	-38.44**	25.01	-49.27**	21.99	-65.51**
	(17.48)*	(15.74)	(16.67)	(14.20)	(15.70)	(16.37)	(18.38)	(16.97)
Quadratic	-11.33*	21.24**	-11.30*	14.71**	-7.37	18.21**	-6.53	23.66**
	(15.68)	(5.16)	(5.41)	(4.64)	(5.10)	(5.35)	(5.99)	(5.57)
Affiliation with	0.04*	0.06**					0.05*	0.06**
Deviant Peers	(0.02)	(0.01)					(0.02)	(0.01)
Involved Vigilant			-0.12**	-0.32**			-0.17**	-0.26**
Parenting			(0.05)	(0.06)			(0.06)	(0.05)
Harsh Parenting					0.11*	0.14**	0.18**	0.14**
					(0.05)	(0.39)	(0.07)	(0.03)

* $p<0.05$, ** $p<0.01$

The meaning of the time-varying covariates was not clear with only the coefficients presented in the table. PROC TRAJ provides an option that researchers can use to plot the predicted mean trajectory of the outcome variable under different hypothetical levels of covariates. To do so, we used three levels for each covariate: Low (one standard deviation below the mean), middle (the mean), and high (one standard deviation above the mean). We then ran model 4 with various settings of levels of covariates. In the following sections, we presented two sets of the analyses, univariate and bivariate analyses, to explore the dynamic relationships between two parenting measures and adolescent delinquency.

The effect of involved vigilant parenting on trajectory change

The univariate analyses showed the effects of single covariate on the trajectory after controlling for other covariates. We presented six models for the parenting measures in the analysis. We first introduced the baseline model in which every covariate was in the middle level. Second, we ran the model with the parenting measures in the low level across time. Then, for the next four models, we set the parenting measures in the high level starting at 17, 15, 14, and 13 years old. The last model had the high parenting across time.

Figure 2 presented the impact of involved vigilant parenting on delinquent trajectory for late and early starters. When parents exerted low involved vigilant parenting over time (Model 1), late starters ended up with the highest delinquency. We also observed that the level of delinquency did not have much difference across models at the first three ages. Model 2 through 5 showed that as long as parents exerted a high level of involved vigilant parenting at age 17, their boys had a low level of delinquency. For late starters, the effect of this positive parenting measure was the strongest at age 17.

The results for early starter boys showed that the three covariates altered the delinquent trajectory. We can see in model 2 through 5 once parents exerted high involved vigilant parenting, the level of delinquency dropped. The effect of this parenting measure was similar at each wave. This indicated that the intervention of positive parenting for early starter boys worked at any time throughout late childhood to mid-adolescence.

The results provided substantial support for the importance of parenting. Involved vigilant parenting decreased delinquency for both late and early starter boys. The results also showed a dynamic relationship between involved vigilant parenting and delinquency for different trajectory groups. The impact of this parenting measure was found more for late starters at age 17, while it had similar influences for early starters across time. This finding was not addressed in the types of delinquency approach and merited further exploration.

The effect of harsh parenting on trajectory change

Figure 3 showed the impact of harsh parenting on delinquent trajectories for late and early starter boys. The settings of the models were the same as those in the vigilant involved parenting analyses. For late starter boys, although harsh parenting had a positive correlation on the delinquent trajectory, the effect was not large. The difference between model 1 (low level of harsh parenting over time) and model 5 (high level of harsh parenting over time) was small. The largest difference was in the last wave, although the difference was trivial. Other than that, we did not see much difference between models. The impact of harsh parenting was trivial for this group of boys, under the social context of Taiwan in which harsh (corporal) parenting is acceptable and common.

The situation for early starter boys showed a similar trend as presented in involved vigilant parenting models. Different from what we saw in above

for late starters, harsh parenting had some impact on the delinquent trajectory. Model 1 had a low level of delinquency trajectory, while model 5 showed the highest. The rise of harsh parenting at each age corresponded to the increase of the delinquent trajectory.

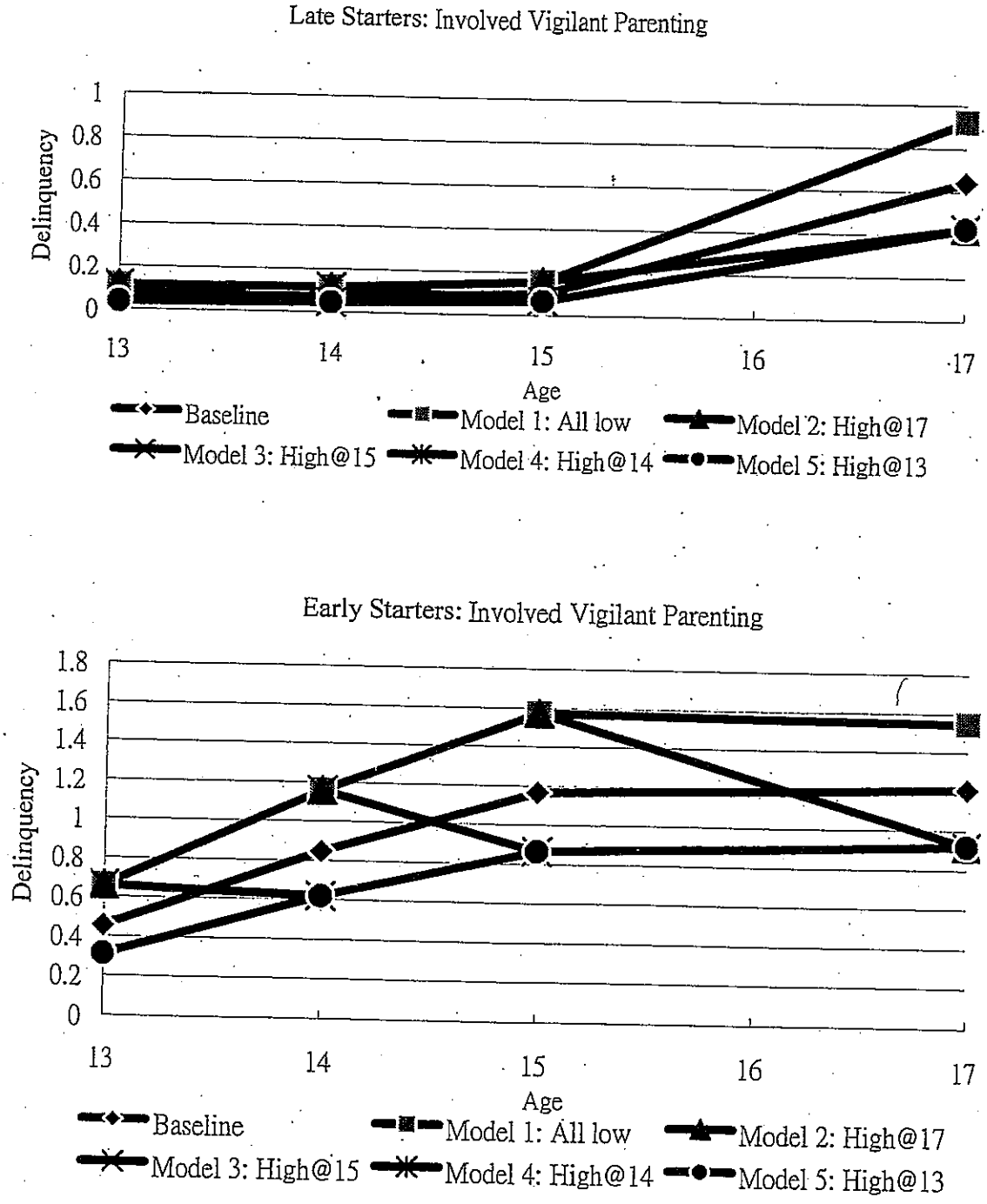
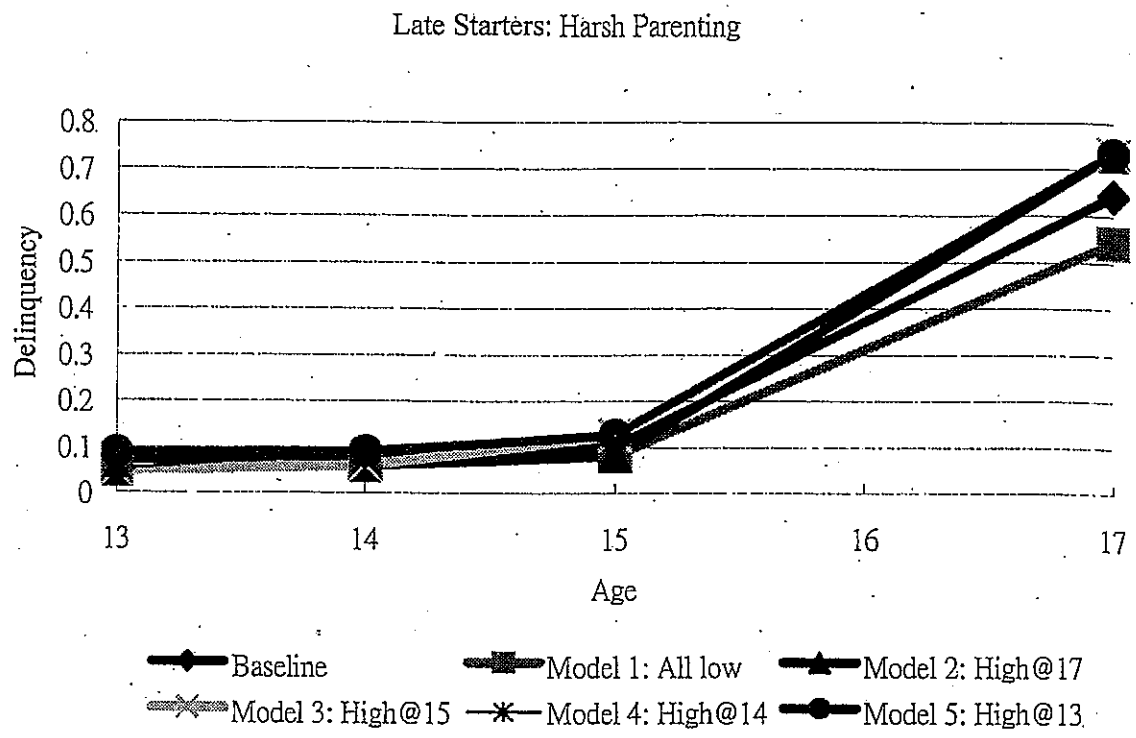


Figure 2. Univariate Analysis in Time-Varying Model: Involved Vigilant Parenting



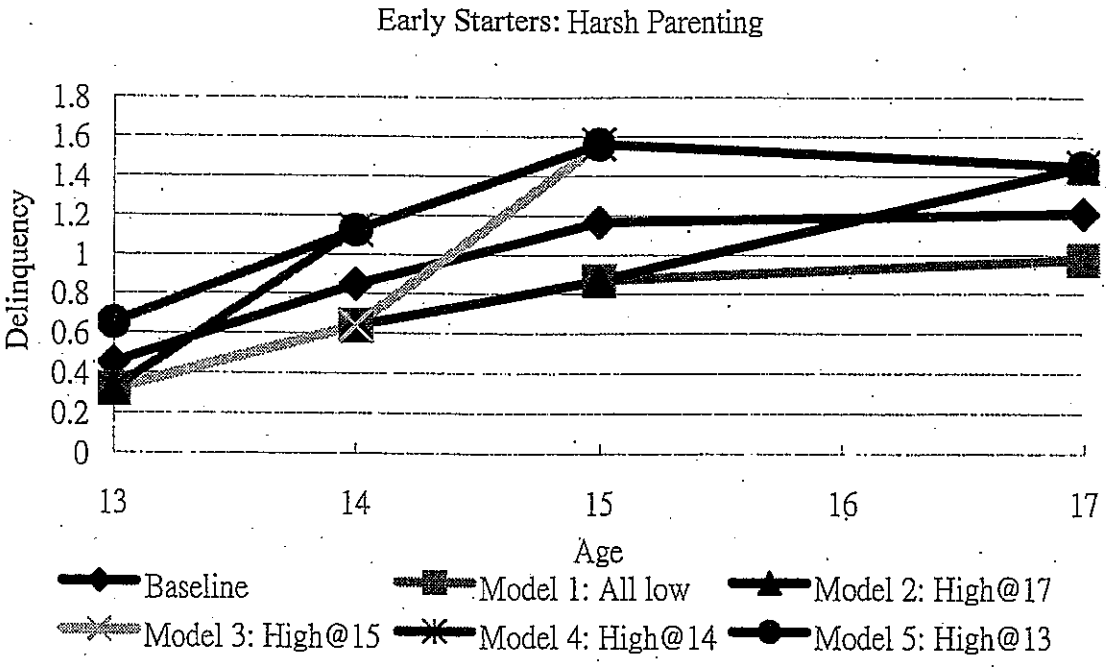


Figure 3. Univariate Analysis in Time-Varying Model: Harsh Parenting

The effect of involved vigilant and harsh parenting on trajectory change

The bivariate analyses presented the effects of two parenting measures on the trajectory after controlling for affiliation with deviant peers. This was important, since we can see the change of the trajectory when kids moved in-and-out of the high level of the two parenting measures. The bivariate analysis had many possible settings for the change of the covariates. We did not present all the possibilities, since it would be overwhelming. To investigate the effects of two parenting measures over time, we focused on the moving in-and-out of positive and negative parenting. Eight models were presented. First, we introduced the baseline model in which every covariate was in the middle level. Second, we set both parenting measures in the same level over time in model 1 (all low) and 3 (all high). Model 2 showed low level of positive parenting with high level of negative parenting. The settings in model 4 and 5 intended to test to what extent the delinquency would change if parents exerted one of the parenting less at later stage while they exerted high level of the other parenting. Model 4 presented the result for changing positive parenting into low level after age 15, while model 5 showed the result for changing negative parenting into low level after age 15. Model 6 and 7 investigated to what extent the delinquency changed if parents exerted one of the parenting less at early stage, while they exerted high level of the other parenting. Model 6 presented the result for changing positive parenting into low level at age 13 and 14, while model 7 showed the result for changing negative parenting into low level at age 13 and 14.

Figure 4 showed the bivariate results for boy late and early starters. Late starter boys showed a different level of delinquency at age 17 across models, while there was little difference across models at the first three time points. We can see at age 17 model 2 and 4 had the highest delinquency,

since parents had low positive parenting and high harsh parenting either across time or at later time points. Delinquency in model 1 reached the second high at age 17 as we can see parents exert low level of both positive and harsh parenting. On the other hand, model 5 had the lowest delinquency, since parents exerted positive parenting across time and decreased harsh parenting at later time points. As we have seen in the previous results, two parenting measures did not alter the trajectory at the first three time points, but they did make a change at the last time point.

The models for early starter boys showed a lot of change under different settings for the two parenting measures. In the first three models, we can see model 1 and 3 had similar trajectories, while model 2 had a trajectory with the highest level of delinquency over time. The parenting style presented in model 1 was like the ignorant parenting style. It had similar effect on the trajectory while parents exerted low positive parenting and high harsh parenting. This indicated that in the current data, positive and harsh parenting had a similar effect on delinquency. They canceled the effect of each other in model 3.

Model 4 and 6 provided an interesting contrast. Model 4 showed the decrease of positive parenting in later time points and a high level of harsh parenting over time. Model 6 had low positive parenting in early time points and a high level of harsh parenting over time. We can see there was a jump at age 15 in model 4 and the trajectory ended up with the highest level of delinquency due to the decrease of positive parenting. Model 6 had an early jump in the delinquent trajectory and the trajectory decreased after age 15.

On the contrary, model 5 and 7 showed the opposite settings. Model 5 had a decrease of harsh parenting at the later time points and high positive parenting over time, while model 7 had low harsh parenting at the early time points and high positive parenting over time. Therefore, we can see the

trajectory in model 5 decreased after age 15 and ended up with the lowest delinquency. Model 7 had the lowest initial level of delinquency and increased by age 15. After that the trajectory stayed constant and had a similar level as that in model 3.

Time-varying analysis presented here showed how the change of delinquent trajectory associated with the two parenting measures. The findings displayed the dynamic impact of the covariates on the trajectories: their abilities to alter the delinquent trajectories. This corresponded to the arguments of developmental theory, but did not support the arguments of self-control theory. Even for early starters who were said to have high temperament problems in childhood, their developmental trajectories still can change with the change of their environment (i.e. parenting in this study).

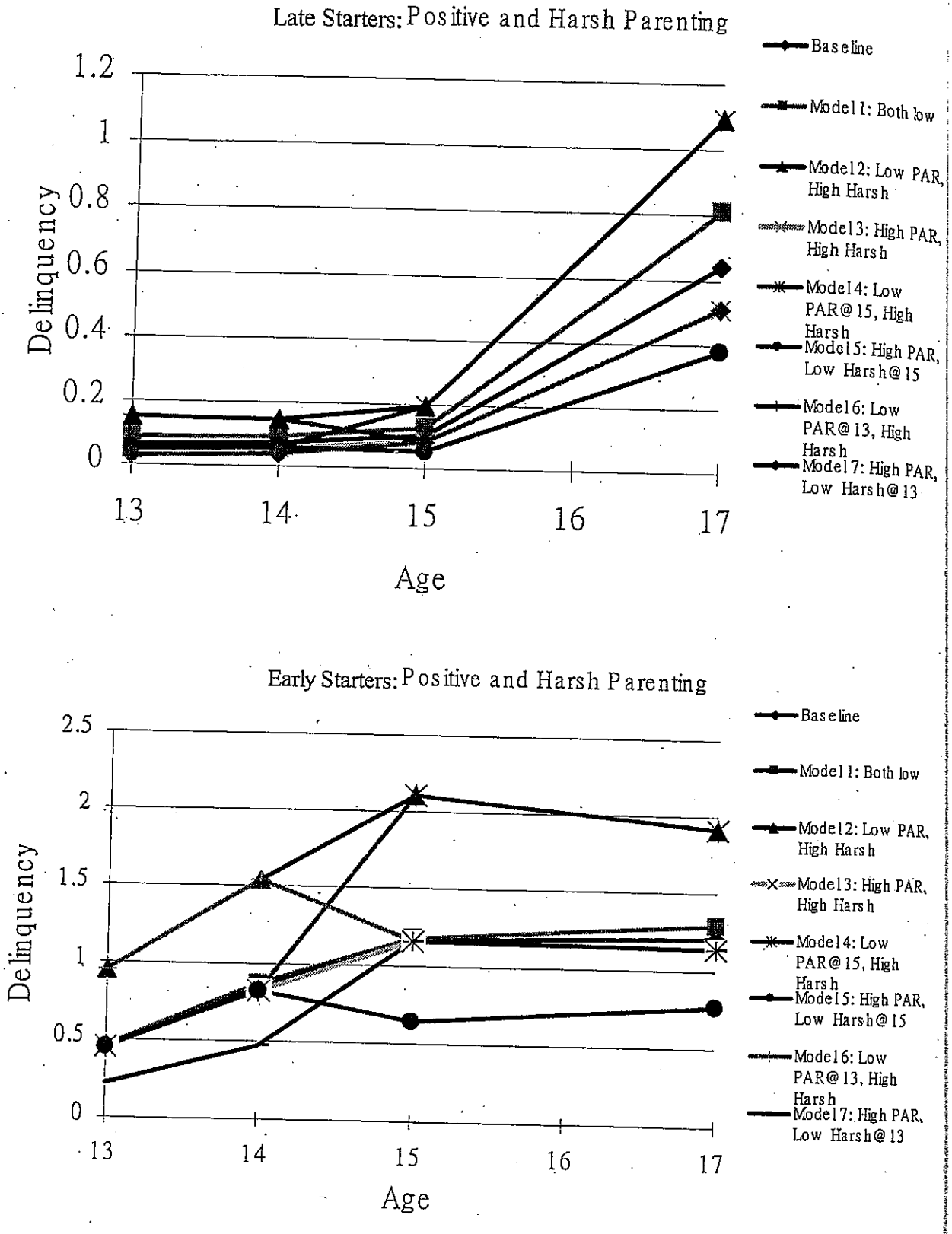


Figure 4. Bivariate Analysis in Time-Varying Model: Involved Vigilant and Harsh Parenting

Conclusion

The investigation of types of delinquents responded the need for explanation of the continuity and discontinuity of delinquent trajectories. The theories proposed that different groups of delinquents are responsible for the continuity and discontinuity of their delinquent acts. The observation of early starters/life course persistent delinquents provided an answer to the continuity argument, while the late starters/adolescent limited delinquents explained the desistance of delinquency in the age-crime curve proposed in Godfredson and Hirshi's book (1990). The advance of statistical methods in group-based model provided a good tool for testing this argument of heterogeneous offending population in the past decade. Researchers has adopted group-based model/mixture model for investigating types of delinquents using various longitudinal data sets in Western countries. Although they had disagreement on the number of offending groups, the studies had positive evidence for the heterogeneous argument. Moreover, these studies also provided supportive evidence about the differential association of covariates related to delinquency with offending groups. However, these studies did not cover two empirical gaps in literature of types of delinquents. First, all the studies were done in Western countries. To our best knowledge, there is no empirical test of the theories in Non-western countries. Second, the investigation of the covariates of delinquents reminded static. The studies failed to take advantage of the longitudinal data to investigate the dynamic relationships between delinquency and its covariates across time.

The current study tried to fill the gaps in literature of types of delinquents by using a Non-western longitudinal data and incorporating the covariates longitudinally. Using PROC TRAJ, our work achieved two research aims. First, we found two trajectory groups of delinquency for

boys over five years period. The two trajectory groups corresponded to what Patterson et al. (1992) and Moffitt (1997) argued, while with the genuine of our delinquency measure we intended to use the terminology in Patterson et al. We found early starters who started their delinquency at early stage of the life course and persisted over five years and late starters who started their delinquency around age 17. The group size for these two groups was similar to the theoretical argument and in profile analysis we found supportive evident concerning the differential association between the theoretical covariates and delinquency. In sum, we found consistent empirical evidence between the results from Taiwan and those found from Western countries.

The findings of time-varying parenting analyses filled the literature gap both in parenting studies and in types of delinquents perspective. Different from the static view in past parenting studies, we took advantage of the capacity in TRAJ to explore the dynamic relationships between two parenting measures and delinquency over time. In parenting studies, we presented that positive and negative parenting altered the trajectories of delinquency over time. With different settings of the parenting measures over time, we saw changes in adolescent delinquency when parents exerted more or less parenting at or after certain age points. In the bivariate analysis, we observed dynamic relationships between positive and harsh parenting concerning delinquency. With different settings of introducing high or low positive and harsh parenting, we observed the move-in-and-out of delinquency trajectories when parents exerted different levels of positive and harsh parenting at or after certain age points.

The time-varying results also informed the literature of types of delinquents. Our study presented the different patterns of the trajectory change of delinquency for different delinquent groups when introducing low or high levels of positive and negative parenting. For late starters, we

observed the intervening effects of parenting only at age 17, while for early starters, the effects have shown at each age point we covered in this study. The differential association between delinquency and its covariates provided another image for the linked lives and the transition arguments in life course perspectives. Two covariates (i.e. positive and harsh parenting) significantly influenced (altered) the delinquent trajectories for early and late starter boys. The results supported the argument of life course perspectives that developmental trajectories can be altered by personal or environmental factors during the life course (Sampson and Laub, 1993). This result provided meaningful information for the intervention studies of adolescent delinquency. From types of delinquents framework, researchers and specialists of intervention should notice the different patterns and perform relevant intervention at proper timing for each delinquent group.

Although the current study has found consistent evidence with the results found in Western countries, we noticed two differences in our results. Compared to results from Western countries, the group sizes of late starters and 'never' group are relatively large in Taiwan's sample. We were not surprised with this finding, since relative to Western countries, the formal social control from school system in Taiwan is still strong. Therefore, kids in the 'Never' group were prevented from engaging in delinquent acts by the social control of school system. However, the stronger formal control could stimulate stronger rebellion from kids who desire to be 'adults' and autonomy due to their puberty status. Therefore, the relative large group size of the late starters is the consequence of this strong social control of the school system in Taiwan. Besides, even though the educational reform has been performed for ten years in Taiwan, the authoritarian style of the school and class management in the school system reminds. This may reflect on the size of the late starters in the current sample.

Although the current study has found important evidence for the gaps

of types of delinquents literature, there are several limitations needed to be noted. First, due to the limitation of the time span of the data we used; we did not include the delinquency for our sample after age 17. Without the information, we did not know if the early starters continue their delinquency or the late starters start to drop in delinquency. Therefore, the results of the current study need to be interpreted conservatively. We intended to use the terminology of Patterson et al's to note that we observed the difference between the two offender groups in their starting point from late childhood to mid-adolescence. The early/late starter terminology was suitable for this etiology fact; however we did not know if the same terminology matched for the later development of the delinquent trajectories. Future studies in Taiwan need to include more time span. Second, duo to the lack of delinquent items in the latest wave of our data, we were only able to include five items in the original delinquent checklist in the analyses. Although we included beating others as a violent act among the five items, the nature of this delinquency measure was more like rebellious and minor misconducts. Therefore, the interpretation of the early starter group needs caution. Further studies need to be done by creating IRT scores for equating the delinquency scores across waves and including violence and non-violence items in the checklist to make sure whether the early starters are life course persistent or they are just another adolescent limited delinquents with a early start.

The limitations provide a strong support for collecting high quality longitudinal data in Taiwan. Without a good longitudinal design, researchers cannot trace the life course trajectories for delinquents. Therefore, we make the final remark in this paper. Researchers in Taiwan pursuit and know the latest theoretical perspectives very well. However, in the empirical investigation, the collection of good quality data corresponding to these theoretical perspectives remains in its preliminary stage. Few years ago, Glen Elder introduced his life course theory to

Taiwan's researchers. When amazed by the complexity of his theory, we need to note that the theory is based on the accumulation of several longitudinal studies across thirty years. Facing the trend of developmental and longitudinal research in our discipline, investing more in longitudinal studies is worthwhile for today and for the future.

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父母教養與青少年偏差行爲的長期動態關聯：一個群組成長軌跡模型*

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摘要

這篇論文從 Patterson 和 Moffitt 的偏差類型（types of delinquents）的架構出發去探討父母教養與青少年偏差行爲之間的動態關聯。我們試圖回答下列兩個問題：台灣的青少年偏差者呈現幾種的成長軌跡類型？從縱貫的觀點來看，父母教養與青少年偏差行爲以及其成長軌跡的類型有何關聯？

採用中研院社會學研究所的一項長期追蹤調查，這篇文章利用 PROC TRAJ 這個 SAS 的巨集程式進行資料分析。研究結果顯示台灣青年的偏差行爲在爲期五年的時間內呈現兩群的發展類型：早發型和晚發型。其分類以及每個類型佔樣本的比例皆與既有的理論相符合。在探討父母教養與偏差行爲的動態關係分析上，研究結果顯示正面和負面的教養行爲皆顯著地影響偏差的成長軌跡。然而，對於不同的偏差成長軌跡類型，父母教養行爲具有不同的影響力和影響模式（patterns）。對晚發型的青少年來說，父母教養在青少年時期產生最大的效果。而對早發型的青少年來說，父母教養則是在每個時間點皆具有明顯的影響力。作者們依據此一研究結果提供家庭與偏差行爲研究者建議。

關鍵字：偏差類型、群集爲基底的模式、隨時間變動的共變項、父母教養

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