Identifying Patterns of Delinquent Trajectories and Testing Stability of Self-Control Over Time among South Korean Youth using Multivariate Latent Growth Curve Modeling

Wanhee Lee
University of Southern Mississippi

Follow this and additional works at: https://aquila.usm.edu/dissertations

Part of the Juvenile Law Commons, and the Law Enforcement and Corrections Commons

Recommended Citation
https://aquila.usm.edu/dissertations/802

This Dissertation is brought to you for free and open access by The Aquila Digital Community. It has been accepted for inclusion in Dissertations by an authorized administrator of The Aquila Digital Community. For more information, please contact aquilastaff@usm.edu.
IDENTIFYING PATTERNS OF DELINQUENT TRAJECTORIES AND TESTING
STABILITY OF SELF-CONTROL OVER TIME AMONG SOUTH KOREAN YOUTH
USING MULTIVARIATE LATENT GROWTH CURVE MODELING

by

Wanhee Lee

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

May 2012
ABSTRACT

IDENTIFYING PATTERNS OF DELINQUENT TRAJECTORIES AND TESTING STABILITY OF SELF-CONTROL OVER TIME AMONG SOUTH KOREAN YOUTH USING MULTIVARIATE LATENT GROWTH CURVE MODELING

By Wanhee Lee

May 2012

The South Korean yearly national report revealed that since 2006 there has been a steady increase in juvenile crimes (Seoul Police Department, 2009). In addition, the report demonstrated that South Korean juveniles’ age of onset in delinquent activity has been continuously decreasing. In South Korea, the age-crime curve sharply peaks at age 16, holds constant until 19, and then begins to decline. Thus, this “peak” within the age-crime curve has been a frequently researched topic. This has resulted in some empirical support demonstrating that the age in which criminal involvement peaks is considered the most dynamic period in individuals’ life-course (Wiesner & Windle, 2004). Thus, juveniles are most susceptible to criminality when they are experiencing the most physical, emotional, and academic changes. With such a lack of stability, juveniles may seek control through other means; thus committing deviant acts.

The purpose of this study is to identify distinctive trajectories of delinquent behaviors during adolescence, and based on observed patterns, examine the association between variables representing control theories of crime, demographic variables, and their relationship with identified developmental trajectories of delinquency. This study will be conducted through use of the Korea Youth Penal Study (KYPS), a six-year longitudinal study (from 2003 to 2008) of South Korean youth. This data will be
employed to examine how social control affects delinquency involvement throughout the life-course by examining developmental trajectory patterns. Additionally, this study will examine the stability of self-control as a time-variant variable, as well as how levels of self-control relate to offender groups across a five-year period among South Korean youth.

The method of analysis consists of two stages. First, it aims to identify distinctive patterns of juvenile delinquency by applying the method of dynamic classification of the offender model as first implemented by Loeber, Stouthamer-Loeber, Von Kammen, and Farrington (1991) in their study on juvenile offending. Then, contingent on observed patterns, a series of latent growth modeling (LGM) will be used to examine the trajectory of delinquent youths’ individual growth or change curves, as well as the influence of the levels of self-control on juvenile delinquency over time. The current study will provide information on the developmental trajectories of South Korean youth and how those behavioral patterns/trajectories significantly affect various offender groups. The results from this analysis will be examined in light of previous findings and policy implications discussed.
IDENTIFYING PATTERNS OF DELINQUENT TRAJECTORIES AND TESTING
STABILITY OF SELF-CONTROL OVER TIME AMONG SOUTH KOREAN YOUTH
USING MULTIVARIATE LATENT GROWTH CURVE MODELING

by

Wanhee Lee

A Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Approved:

W. Wesley Johnson
Director

Alan Thompson

O. Hayden Griffin, III

Richard S. Mohn

Susan A. Siltanen
Dean of the Graduate School

May 2012
DEDICATION

First and foremost, I dedicate this dissertation to my father, Sanghyun Lee, whose support, advice, and patience were indispensable in the process of writing this dissertation. Likewise, I dedicate this dissertation to my elder brother, Kwonhee Lee, and younger brother, Dohee Lee, for their unconditional love and support throughout this entire process. Thank you to my entire family for always believing in me; I love you all.
ACKNOWLEDGMENTS

I would like to thank my dissertation chair, Dr. W. Wesley Johnson, and the other committee members, Dr. Alan Thompson, Richard Mohn, and Hayden Griffin, for their advice and support throughout this dissertation process. I would especially like to thank Dr. Johnson for whom I have the utmost respect and admiration. I am thankful for his insightful, patient guidelines, and theoretical assistance on this dissertation. In addition, he helped guide my writing and framed the structural development of this dissertation. Also, I would like to thank Dr. Thompson who generously shared his time providing analytical recommendations and statistical advice. Furthermore, thanks to Dr. Mohn, who always made time to advise, direct, and encourage me to use advanced statistics along with longitudinal data. I would like to give thanks to Dr. Griffin for his thoughtful direction, comments, and deeply appreciated support. Furthermore, I am also thankful to Dr. Lisa Nored who has provided me with invaluable support, recommendation, and guidance. Special thanks to Ms. Suzy Lee, Dr. Joohee Lee, Judge Donald Johnson, Dr. Junseob Moon, and Ms. Vanessa Woodward for their support and assistance during the entire process of writing this dissertation. Finally, I am extremely grateful to my supportive family. This dissertation would not have been possible without the help and support of these people.
TABLE OF CONTENTS

ABSTRACT ........................................................................................................................................... ii

DEDICATION ........................................................................................................................................ vi

ACKNOWLEDGMENTS ....................................................................................................................... vii

LIST OF TABLES ................................................................................................................................... viii

LIST OF ILLUSTRATIONS .................................................................................................................. xi

CHAPTER

I. INTRODUCTION ................................................................................................................................. 1

   Background Information
   Statement of the Problem
   Definition of Key Terms
   Conclusion

II. LITERATURE REVIEW ..................................................................................................................... 8

   Cultural Context of South Korea
   Social Control Theories
   A General Theory of Crime
   The Stability of Self-control
   Developmental (Life-course) Theories of Crime
   Variations in Juvenile Delinquent Behaviors
   Application of LGM Model of Developmental Trajectories
   Summary

III. METHODOLOGY .............................................................................................................................. 44

   Data
   Measurement of Variables
   Research Questions and Hypotheses
   Data Analysis
   Limitations
   Summary
IV. RESULTS .................................................................................................................. 58

Characteristics of Participants
First Goal of the Study
Stage I: Identifying Trajectories of Juvenile Delinquency
Stage II: Three Latent Growth Models (LGMs)
Model I: The Stable Offender Group
Model II: The Late-onsetter Group (LOG)
Model III: The Desister Group
Second Goal of the Study
Absolute Stability (within-individual)
Relative Stability (between-individual)
Hypotheses Testing
Summary of Findings

V. DISCUSSION ............................................................................................................. 121

Summary of Findings and Discussions
Theoretical and Empirical Implications
Policy Implications
Advantages of LGM Framework
Limitations
Implications for Future Research
Conclusion

APPENDIXES .......................................................................................................... 149

REFERENCES ............................................................................................................. 150
<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Crime Trends in South Korea</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Juvenile Crime Involvement by Age in South Korea</td>
<td>11</td>
</tr>
<tr>
<td>5.</td>
<td>Time-invariant Variables (Demographic Characteristics)</td>
<td>59</td>
</tr>
<tr>
<td>6.</td>
<td>Descriptive Longitudinal Analysis of Time-variant Variables across Five Waves</td>
<td>60</td>
</tr>
<tr>
<td>7.</td>
<td>Descriptive Longitudinal Analysis of Juvenile Offending across Five Waves</td>
<td>61</td>
</tr>
<tr>
<td>8.</td>
<td>Characteristics of Offending Trajectory Groups by Gender</td>
<td>67</td>
</tr>
<tr>
<td>9.</td>
<td>Parameter Estimates from the Final LGM for the Stable Offender Group</td>
<td>81</td>
</tr>
<tr>
<td>10.</td>
<td>Parameter Estimates from the Final LGM for the LOG</td>
<td>90</td>
</tr>
<tr>
<td>11.</td>
<td>Parameter Estimates from the Final LGM for the Desister Group</td>
<td>98</td>
</tr>
<tr>
<td>12.</td>
<td>Correlation Coefficients and Descriptive Statistics between Each Reported Mean Levels of Self-control for All Five Waves (Non-offenders)</td>
<td>102</td>
</tr>
<tr>
<td>13.</td>
<td>Correlation Coefficients and Descriptive Statistics between Each Reported Mean Levels of Self-control for All Five Waves (Stable offenders)</td>
<td>104</td>
</tr>
<tr>
<td>14.</td>
<td>Correlation Coefficients and Descriptive Statistics between Each Reported Mean Levels of Self-control for All Five Waves (Late-onsetters)</td>
<td>105</td>
</tr>
<tr>
<td>15.</td>
<td>Correlation Coefficients and Descriptive Statistics between Each Reported Mean Levels of Self-control for All Five Waves (Desisters)</td>
<td>107</td>
</tr>
</tbody>
</table>
# LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age and Juvenile Crime by Year in South Korea</td>
<td>12</td>
</tr>
<tr>
<td>2.</td>
<td>Step I: A Basic Latent Growth Model</td>
<td>53</td>
</tr>
<tr>
<td>3.</td>
<td>Step II: Latent Growth Model including Time-invariant Variables</td>
<td>53</td>
</tr>
<tr>
<td>4.</td>
<td>Step III: Latent Growth Model including Time-varying Covariates</td>
<td>54</td>
</tr>
<tr>
<td>5.</td>
<td>Five-year Trends of Involvement of Delinquency 15 to 19 Years Old</td>
<td>62</td>
</tr>
<tr>
<td>6.</td>
<td>Predicted Adolescent Offending Trajectories among South Korean Youth 15 to 19 Years Old</td>
<td>66</td>
</tr>
<tr>
<td>7.</td>
<td>Statistical Analysis Map of the Study</td>
<td>69</td>
</tr>
<tr>
<td>8.</td>
<td>Theoretical Models of Juvenile Offending and the Direct/indirect Effects of Parental Attachment and Low Self-control as Time-varying Covariates</td>
<td>70</td>
</tr>
<tr>
<td>9.</td>
<td>A Basic LGM of Juvenile Offending for the Stable Offender Group ( n = 305 )</td>
<td>74</td>
</tr>
<tr>
<td>10.</td>
<td>LGM of Juvenile Offending Including Time-invariant Variables for the Stable Offender Group ( n = 305 )</td>
<td>76</td>
</tr>
<tr>
<td>11.</td>
<td>Hypothesized Longitudinal CFA Model at the Subscale Level with Five Repeated Measurement of Time-varying Covariates</td>
<td>79</td>
</tr>
<tr>
<td>12.</td>
<td>The Final Model Included Two Time-varying Covariates for the Stable Offender Group ( n = 305 )</td>
<td>80</td>
</tr>
<tr>
<td>13.</td>
<td>A Basic LGM of Juvenile Offending for the LOG ( n = 596 )</td>
<td>84</td>
</tr>
<tr>
<td>14.</td>
<td>LGM of Juvenile Offending Including Time-invariant Variables for the LOG ( n = 596 )</td>
<td>86</td>
</tr>
<tr>
<td>15.</td>
<td>The Final Model Included Two Time-varying Covariates for the LOG ( n = 596 )</td>
<td>88</td>
</tr>
<tr>
<td>16.</td>
<td>A Basic LGM of Juvenile Offending for the desister group ( n = 383 )</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>17.</td>
<td>LGM of Juvenile Offending Including Time-invariant Variables for the Desister Group ( n = 383 ).</td>
<td>94</td>
</tr>
<tr>
<td>18.</td>
<td>The Final Model Included Two Time-varying Covariates for the Desister Group ( n = 383 ).</td>
<td>96</td>
</tr>
<tr>
<td>19.</td>
<td>The Non-offender Group: Estimated Mean Levels of Self-control and Levels of Seriousness of Offending by Age.</td>
<td>101</td>
</tr>
<tr>
<td>20.</td>
<td>The Stable Offender Group: Estimated Mean Levels of Self-control and Levels of Seriousness of Offending by Age.</td>
<td>103</td>
</tr>
<tr>
<td>21.</td>
<td>The LOG: Estimated Mean Levels of Self-control and Levels of Seriousness of Offending by Age.</td>
<td>105</td>
</tr>
<tr>
<td>22.</td>
<td>The Desister group: Estimated Mean Levels of Self-control and Levels of Seriousness of Offending by Age.</td>
<td>106</td>
</tr>
<tr>
<td>23.</td>
<td>Four distinctive Developmental Offending Trajectories Groups’ Estimated Mean Levels of Self-control by Age.</td>
<td>110</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

Background Information

Within the past twenty years, the literature on life-course criminology has increased substantially. Life-course criminology purports that individuals’ developmental stages throughout the life-course can be used to explain the onset, persistence, and desistance of criminal behavior (Chung, Hawkins, Gilchrist, Hill & Nagin, 2002a; Fergusson, Horwood & Nagin, 2000; Giordano, Cernkovich & Rudolph, 2002; Patterson, Deborah & Lew, 1991; Sampson & Laub, 1993: Moffitt, 1993). The study of developmental trajectories is widely recognized in the field of criminal justice. Life-course criminologists have focused on the relationship between individual characteristics and delinquent behavior as well as the variability of delinquency within observed developmental trajectories.

In the majority of theories that focus on juvenile delinquency, the role of the family, as well as the families’ effects on individuals, are considered to be one of the most significant predictors of delinquent involvement (Akers & Sellers, 2004). Researchers who have explored the influence of family on juvenile delinquency, generally have found that family involvement is the most significant variable of explaining juvenile delinquency (Erickson, Crosnoe, & Dornbusch, 2000; Longshore, Chang, & Messina, 2005; Sheu, 1988).

According to social control theorists, familial involvement may be indirectly related to delinquency. Cernkovich and Giordano (1987) found that familial involvement explains social interactions, individual growth, and emotional maturation. Thus, it is
those social characteristics that may directly explain susceptibility to criminality. While it is evident that the family role is pertinent within American culture, these variables arguably could be of even more importance within the South Korean culture, as the salience of parental roles to juveniles’ development is exceptionally prominent. While it is feasible to believe that these same traits may be generalizable to North Korea, the aim of this study is to focus solely on South Korean culture.

Moreover, while parental roles are of the utmost importance in juvenile development in the traditional South Korean context, the mother is considered to be the primary caretaker of the entire family. The mother is solely responsible for raising the children, taking care of her parents and relatives, as well as managing the household economy (Kim, Park, Kwon, & Koo, 2005). Additionally, it is the mother’s responsibility to discipline her children correctly, as to ensure that conventional goals are sought through conventional means. The South Korean culture portrays motherhood to be the most important role in the family, as they are expected to provide persistent and enduring support for the children in South Korea (Kim et al., 2005).

In addition to familial roles, criminologists have also argued that the variability that exists within specific developmental stages significantly contribute to explaining juvenile delinquency. Numerous studies have consistently indicated the existence of an age-crime curve; that delinquent behavior escalates during early adolescence, sharply peaks in late adolescence, and decreases in early adulthood (Loeber, Stouthamer-Loeber, Von Kammen, & Farrington, 1991; Moffitt, 1993; Patterson, et al., 1991; Sampson & Laub, 2003).
Developmental theories of crime have attempted to explain why this adolescent stage is when a juvenile is most susceptible to deviant behavior. While most studies have focused on the differences in development between non-offenders and offenders, recently, there has been empirical support demonstrating that offenders can be classified into distinct groups, and that these classifications are imperative to understanding delinquent patterns (Wiesner & Windle, 2004).

Theories regarding the development of juvenile delinquent behavior focus on factors related to the developmental process, specifically, the age of onset, persistence of antisocial behaviors, and desistence from crime (Moffitt, 1993; Sampson & Laub, 2003). It has been argued that longitudinal data is necessary to examine these aforementioned variables in relation to age and criminal behavior (Chung, et al., 2002a; Moffitt, 1993; Sampson & Laub, 2003). Furthermore, because there are individual differences in the trajectories of delinquent behavior, there is variability in patterns of individual growth, which then affects predictors of juvenile delinquency among adolescents (Chung, et al., 2002a; Kreuter & Muthen, 2008; Windle, 2000). Thus, in addition to examining longitudinal research, there is also a need for more research on various samples to expand the generalizability of past findings (Wiesner & Windle, 2004).

Lastly, low self-control has been argued to be a significant predictor within juvenile delinquency throughout the life-course. Gottfredson and Hirschi’s (1990) A General Theory of Crime provided two propositions: (1) that levels of self-control are established by parental control rather than biological or psychological factors, and (2) that this self-control should remain relatively stable over the life-course by age 8 to 10. Even though self-control theory is one of the most frequently and consistently tested
criminological theories, most studies have focused on the primary argument of the theory, which is the relationships between child rearing and children’s levels of self-control, disregarding tests of the constancy of self-control throughout the life-course (Pratt & Cullen, 2000).

Testing self-control theory and its relationship to developmental stages is novel, and therefore, empirical evidence of the stability of self-control throughout the life-course exists. The few who have examined the stability of self-control have tested it within one of three ways: by examining the relationship between the levels of self-control over time by focusing on absolute stability (within individual differences) (e.g., Arneklev, Cochran, & Gainey, 1998; Raffaelli, Crockett, & Shen, 2005), by examining the relative stability (between individual differences) over the life-course (e.g., Burt, Simons, & Simons, 2006; Turner & Piquero, 2002), or by examining the impact of biological factors on the stability of low self-control over time (e.g., Beaver, Wright, DeLisi, & Vaughn, 2008). All of these past studies, however, have failed to control for offenders’ typologies, thus only comparing offenders to non-offenders, regardless of the offenders’ crime. Nevertheless, research that has controlled for these various patterns have demonstrated there to be four distinct typologies: escalators, chronic offenders, desisters, and late-onsetters (Chung, et al., 2002a; Fergusson, et al., 2000; Loeber, et al., 1991). Thus, it is plausible that one offender’s delinquent patterns may be distinctly unique from another.

Statement of the Problem

There has been some evidence that has demonstrated a continuous increase of juvenile crime within South Korea. According to the yearly national report of the South Korean Police (2009), juvenile delinquent crime is one of the major problems in South
Korea. Prior to 2006, there was actually a slight decrease in juvenile crime (2002-2005); however, since 2006, there has been a continuous increase (Seoul Police Department, 2009). Juvenile delinquent crime is inarguably an international issue, as the age-crime distribution is virtually consistent throughout all societies; thus, the onset and peak of deviant activity begins during an individual’s youth, regardless of culture. Moffitt (1993) indicated that most delinquent behavior is adolescence-limited, meaning the delinquent behavior is restricted to youth and quickly declines thereafter. While the normal age-crime curve indicates the onset of criminal behavior to peak at 19, in South Korea, the peak takes place at 16 (Seoul Police Department, 2009). From a developmental perspective, this is plausibly problematic, as the most dynamic period for development has been shown to be significantly related to the onset of delinquent behavior (Wiesner & Windle, 2004). Therefore, juvenile delinquency has become a major concern for South Korean society.

Definition of Key Terms

There are some important terms that help to understand this study. These include: absolute stability of self-control, relative stability of self-control, latent growth curve, and time-varying covariate/s.

(1) *Absolute stability*: Absolute stability can be understood as the constancy within a single individual’s self-control that takes place over time. In other words, the absolute level of self-control at one age should be equal to at later age (Hay & Forrest, 2006).

(2) *Relative stability*: Relative stability can be understood as the constancy of the differences between same aged individuals’ levels of self-control regardless
of individuals’ life changes. To expand, although age may affect an individual’s level of self-control, the difference between that individual’s level of self-control and others’ levels of self-control are static (Gottfredson & Hirschi, 1990).

(3) **Latent growth curve**: Latent growth curve/s are also referred to as latent trajectories, latent curve/s, and growth trajectories (Duncan, Duncan, & Strycker, 2010). A latent growth curve is employed to examine change over time within one individual or multiple individuals (Duncan, et al., 2010). Latent growth curve/s can be used to represent individual differences by observing the varying slopes and intercepts (Kline, 2005).

(4) **Time-varying covariate (TVC’s)**: Time-varying covariates are employed in an extension model of the basic latent growth model, which can also be referred to as a multivariate latent growth curve model. These models incorporate one or more covariates that vary across time (Curran, Muthen, & Harford, 1997; Duncan, et al., 2010). According to Curran et al. (1997), this model allows the researcher to examine or predict “time specific influences of single or multiple measures of status change together with the estimation of the normative growth trajectory of a given construct over time” (p. 648).

**Conclusion**

Previous studies on juvenile delinquency, life-course criminology, and social control theories were assessed through the analysis of developmental trajectories. Thus, by using a multivariate latent growth model, this study aims to examine how the stability of self-control is affected and how levels of self-control affect juveniles’ involvement in
delinquent acts over a five-year period. In the past two decades, there has been a surge within the literature focusing on individuals’ persistence and desistance from crime throughout the life-course. Additionally, there has been ample research on self-control as well as a focus on the stability of self-control, both within an individual and in comparison to others.

To further examine the empirical support of these theories, Chapter II will provide a review of the literature that examines empirical studies on social control, self-control, and life-course criminology. Additionally, the benefits of latent growth modeling being used to measure criminal activity throughout the life-course will be examined. Conclusions will then be made regarding which variables should be considered for inclusion in the model. Chapter III will discuss the methodology for this particular study and will describe the steps necessary to develop and measure the model. Chapter IV will provide a thorough analysis of all findings. Lastly, Chapter V will examine the policy implications of the results of this analysis.
CHAPTER II
LITERATURE REVIEW

There have been innumerable attempts by theorists to explain why certain people commit crime and others do not. While there are a multitude of observable discrepancies throughout all criminological theories, there has been a consensus that the family and its role in an individual’s life is one of the most significant predictors in explaining socialization, and thus, has been inexhaustibly argued to be a strong indirect indicator of deviant behavior. For instance, according to social control theorists, parental control is related to crime while simultaneously indirectly related to crime through social control. Hirschi (1969), expanding upon the works of Nye (1958) and Reckless (1961), operationalized the effects of parents on deviance through an element of social control: attachment, which included attachment to conventional entities (such as school, church, etc.), but more importantly an individual’s attachment to his/her parents. In 1990, Gottfredson and Hirschi focused on this definition of attachment to explain how self-control is indirectly affected by parenting and is dependent on the child’s parental attachment.

Many social control theorists contend that parental supervision is a significant contributor to the informal control of juveniles as it aims to maintain social norms and conformity. While Hirschi’s (1969) social control theory focuses on social control being comprised of four elements, (attachment, commitment, involvement, and belief), most research has found that it is the attachment of parents that explains the most variance in delinquent behavior (Cheung & NG, 1988; Erickson, et al., 2000; Longshore, et al., 2004; Sheu, 1988; Tanioka & Glaser, 1991; Wiatrowski, Griswold, & Roberts, 1981; Zhang &
Messner, 1996). This was also emphasized in Hirschi’s later work with Gottfredson in 1990, as they contend that the parental role, particularly their ability to effectively or ineffectively rear their child, causes low self-control and can result in analogous behaviors to crime. In other words, ineffective parental control weakens a child’s stakes in conformity (Toby, 1957) and can increase the likelihood of deviant behavior.

Past studies have examined the relationship between juvenile delinquency and parental controls only using cross-sectional data. While these studies may demonstrate the effects of parental control at one moment in time, they fail to examine how attachment to parents changes and affects self-control throughout the life-course. Thus, there has been a recent surge in the literature on the relationship between individual characteristics and delinquency throughout the life-course (Giordano, et al., 2002; Fergusson, et al., 2000; Maruna, 2001; Moffitt, 1993; Sampson & Laub, 1993). In general, most studies that have examined this relationship have included the traditional variables within the model, yet expand by examining how each variable’s explanatory pattern differs throughout the life-course dependent on the developmental stage. There have been some conclusions that the familial functions vary over time and affect child development which in turn affects an individual’s susceptibility to crime.

Cultural Context of South Korea

*Juvenile Delinquent Crime Trends in South Korea: Official Statistics*

According to Seoul Police Department (2009), the *Korean Police White Paper*, an annual national report revealed that juvenile delinquent crime is an increasing problem in South Korea. The most recent reported data (2004-2008) revealed that although there was a slight *decrease* in the number of juvenile crimes from 2004 through 2005, there has
been a slight but constant increase since 2006 (Seoul Police Department, 2009). The crimes committed by juveniles consisted of mostly property crime (30.8%), followed by violent crime (24.5%), traffic violations (17.9%) and other crimes (26.9%) from the 2008 estimation (See Table 1).

Table 1

*Crime Trends in South Korea*

<table>
<thead>
<tr>
<th>Year</th>
<th>Total number of Crimes</th>
<th>Juvenile Crimes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2,606,718</td>
<td>92,976 (3.57)</td>
</tr>
<tr>
<td>2005</td>
<td>2,384,613</td>
<td>86,014 (3.61)</td>
</tr>
<tr>
<td>2006</td>
<td>2,401,537</td>
<td>92,643 (3.86)</td>
</tr>
<tr>
<td>2007</td>
<td>2,548,010</td>
<td>116,135 (4.56)</td>
</tr>
<tr>
<td>2008</td>
<td>2,733,185</td>
<td>133,072 (4.87)</td>
</tr>
</tbody>
</table>

*Note.* Data from the Seoul Police Department (2009).

The report also revealed that in 2008 there was a substantial increase in property and violent crime and that the mean age of juvenile delinquents had decreased. It was reported that juvenile delinquency peaked at age 15 to 17, and held constant until it began to sharply decline at age 18 to 19 (Seoul Police Department, 2009). As can be observed in Table 1, juvenile crimes in South Korea decreased by 86,014 (3.6% of the total number of crimes) from 2004 to 2005. From 2005 to 2006; however, the rate of crimes committed by juveniles began to increase, (from 3.61% to 3.86%). From 2006 on there has been a substantial increase, as the rate has risen from 3.86% in 2006 to 4.87% in 2008.
As shown in Table 2, when examining the relationship between age and juvenile delinquency, it can be observed that the age of onset has decreased within the last six years, as juveniles are committing crimes at younger ages (Seoul Police Department, 2009). For instance, it can be observed that from 2004 to 2008, the rate of crimes committed by fifteen-year-olds increased 7.6%.

Table 2

*Juvenile Crime Involvement by Age in South Korea*

<table>
<thead>
<tr>
<th></th>
<th>14 years</th>
<th>15 years</th>
<th>16 years</th>
<th>17 years</th>
<th>18 years</th>
<th>19 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>6,236</td>
<td>9,663</td>
<td>10,588</td>
<td>12,200</td>
<td>15,059</td>
<td>18,348</td>
</tr>
<tr>
<td></td>
<td>6.7%</td>
<td>10.4%</td>
<td>11.4%</td>
<td>13.1%</td>
<td>16.2%</td>
<td>19.7%</td>
</tr>
<tr>
<td>2005</td>
<td>7,121</td>
<td>11,640</td>
<td>12,030</td>
<td>10,755</td>
<td>11,561</td>
<td>13,848</td>
</tr>
<tr>
<td></td>
<td>8.3%</td>
<td>13.5%</td>
<td>14.0%</td>
<td>12.5%</td>
<td>13.4%</td>
<td>16.1%</td>
</tr>
<tr>
<td>2006</td>
<td>9,245</td>
<td>15,582</td>
<td>17,138</td>
<td>14,428</td>
<td>14,302</td>
<td>16,541</td>
</tr>
<tr>
<td></td>
<td>10.0%</td>
<td>16.8%</td>
<td>18.5%</td>
<td>15.6%</td>
<td>15.4%</td>
<td>17.9%</td>
</tr>
<tr>
<td>2007</td>
<td>5,809</td>
<td>19,943</td>
<td>24,557</td>
<td>20,662</td>
<td>18,489</td>
<td>18,144</td>
</tr>
<tr>
<td></td>
<td>5.0%</td>
<td>17.2%</td>
<td>21.1%</td>
<td>17.8%</td>
<td>15.9%</td>
<td>15.5%</td>
</tr>
<tr>
<td>2008</td>
<td>9,393</td>
<td>23,938</td>
<td>29,554</td>
<td>26,358</td>
<td>21,679</td>
<td>12,538</td>
</tr>
<tr>
<td></td>
<td>7.1%</td>
<td>18.0%</td>
<td>22.2%</td>
<td>19.8%</td>
<td>16.3%</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

*Note.* Data from the Seoul Police Department (2009).

Figure 1 illustrates official statistics of juvenile delinquent crime by age. In 2004 and 2005, nineteen-year-olds had the highest frequency of crime. However, from 2006-2008, the peak age dropped from 19 to 16. It is important to note, however, that while criminal involvement seemed to be highest in sixteen-year olds, there was a slight decrease in seventeen through nineteen-year-olds in 2007 and 2008 (Seoul Police Department, 2009). According to the Korean Police White Paper, in the past five years
there has not only been an increase in frequency of crime but also the seriousness of those crimes. In addition to examining the frequency and type of crime committed, it is also imperative to examine further the relationship between criminal involvement and the dynamicity of the juvenile delinquents’ developmental stages (Wiesner & Windle, 2004).

Figure 1. Age and juvenile crime by year in South Korea.

South Korean Family Culture and Structure

In the traditional South Korean social context, the roles of the parents are considered to be of the utmost importance in explaining juveniles’ development, as “a family was imagined as the basis of self and it served as the prototype for all relationships” (Kim, et al., 2005, p. 339). There is a belief within the Asian culture that while a father is the authoritarian and is responsible for taking care of his family, it is the mother’s responsibility to raise the children, take care of her parents and relatives, as well as manage the household finances. Whereas the father is considered the leader of the family, it is the mother who must educate and discipline her children to obey their father. Mothers are generally considered to possess the most significant family role, as they
should be providing consistent and enduring support for the children. “The life-goal for Korean mothers becomes intrinsically attached to their children and children’s accomplishments become their dreams and goals” (Kim, et al., p. 340).

South Korean parents, especially mothers are considered to be more involved or strongly attached to their children’s lives than parents within Western civilization. According to the South Korean family structure, “familism” is a dominant tradition based on Confucian values which refers to strong family solidarity (Cho & Shin, 1996). These values not only heavily influence present-day family dynamics but also influence the roles of education and organization in individuals’ lives (Cho & Shin, 1996; Kim, et al., 2005). Thus, Cheung & Cheung (2008) contend that these values effect the influence of family culture on adolescents’ behavior more than the behavior of children in other cultures. Moreover, while other countries may support more individualistic ideals in their children, children in Asian cultures are “…taught to be submissive, obedient, and disciplined” (p. 416).

Recently, the traditional South Korean family structure has been associated with the American nuclear family structure. According to Chira (1998), since World War II, there has been a substantial increase in women within the workforce, which is similar to South Korea. Since the 1960s, during the industrialization period of South Korea, women started working outside the home, and this has steadily continued to increase (Yoo, Lee, & Yoo, 2007). With most families having two working parents, there has been a significant transformation of the traditional South Korean family structure. Yoo et al. (2007) attributes this increase in dual-income families to the increase in divorce rates, single-mother households, and individuals living without family.
Consistent with Yoo et al.’s arguments, Vander Ven and Cullen (2004) asserted that there is a significant inverse relationship between women in the work force and children’s outcomes. Thus, the more a woman works outside the home, the worse the child’s outcomes. Moreover, a mother working outside the home increases the likelihood of a child having low cognitive skills and less education since s/he is not receiving adequate childcare. While empirical support is still lacking on examining the causality of this relationship (Hill, Waldfogel, Brooks-Gunn, & Han 2005; Vander Ven & Cullen, 2004), the effects of mothers working outside the home has presently not been examined in South Korea.

Social Control Theories

Social Control Theory

Hirschi’s (1969) social control theory, also known as social bonding theory, is one of the most frequently tested theories in the field of criminal justice (Akers & Sellers, 2004). The central argument of the theory is that humans are hedonistic. Thus, seeking unconventional wants and desires are instinctual. Therefore, in order to eliminate criminal behavior, these hedonistic desires must be controlled (Hirschi, 1969). The approach of social control theories is distinct from other theories, as it asks: “Why do men obey the rules of society?”, rather than, “Why do men not obey the rules of society?” (Hirschi, 1969, p. 10).

According to Hirschi (1969), weak social bonds directly contribute to delinquency in juveniles. Hirschi argued that there are four elements of social bonds: attachment, commitment, involvement, and belief. He purported that these four elements can be measured through perceptions and behaviors, and while seemingly multidimensional, are
actually unidimensional as they should validly and reliably comprise one construct: social bond. He asserted that it is the level of bonds that can explain one’s susceptibility to commit deviant behavior.

As previously stated, Hirschi contended that there are four elements to social bonds. The first, attachment, is the emotional element of the social bond. Attachment to others involves an emotional connection to others such as parents, teachers, and friends, as well as various conventional institutions (Hirschi, 1969). This portion of his theory assumes that if an emotional connection exists, adolescents will be more likely to show concern for how others view them. Therefore, young people are less likely to commit juvenile delinquent behavior when they are strongly attached to parents, teachers, friends, and conventional institutions. Prior researchers have found a consistent relationship between weakened attachments to parents and teachers and juvenile delinquency (Cheung & NG, 1988; Erickson, et al., 2000; Longshore, et al., 2004; Sheu, 1988; Tanioka & Glaser, 1991; Wiatrowski, et al., 1981; Zhang & Messner, 1996).

The second element of social control theory, commitment, can be understood as the individual’s investment of time and energy in order to get an education, to build up a business and/or acquire a reputation within his or her community. Hirschi (1969) argued that the greater the investment in these conventional entities, the less likely one will be to commit crime for fear of losing said investments; as children engage in conventional goals and activities they are less likely to partake in delinquent behavior. According to previous empirical studies, commitment within juveniles is often defined as their investment in school. Commitment has been consistently found to be significantly related to juvenile delinquent crime (Chapple, McQuillan, & Berdahl, 2005; Cretacci, 2003;
The third element, involvement, refers to “engrossment in conventional activities” (Gottfredson & Hirschi, 1990, p. 22). Types of involvement, as identified in Hirschi (1969), would include studying, spending time with family, and school activities. The theory assumes that there are constraints on individuals’ time and energy; therefore, if individuals are involved in conventional activities such as work, sports, recreation, and/or hobbies, they will be less likely to commit crime, while individuals who do not partake in time-consuming conventional activities increase their likelihood of committing deviant acts, as idle hands are considered the devil’s workshop. Lastly, belief represents an individual’s conviction of a common value system within his or her society or group (Hirschi, 1969). Belief is considered to be strong when a person fully accepts the moral authority of societal values, for instance, social norms, expectations and/or public laws. Hirschi (1969) argued that if young people believe in social norms and public laws they are less likely to violate them.

Empirical Studies of Social Control Theory and Delinquency

Prior research involving testing Hirschi’s (1969) social control theory has predominantly been examined with American juveniles. Thus, the empirical support thus far demonstrates a limitation in the theory’s generalizability, as there have been few studies that have tested the effects of social control and delinquency in other countries. Moreover, the empirical research on social control and delinquency within Asian countries is even more limited. Table 3 provides a summary of empirical studies conducted on social control theory in both the United States and Asian countries.
The first four columns in Table 3 indicate the authors, years of data collection, location of conducted research, and sample size of each study. The last five columns indicate the dependent variable, delinquency, which varies slightly in its method of measurement, and the effects of attachment, commitment, involvement, and belief. Generally, there has been strong empirical support on the relationship between Hirschi’s (1969) four elements of social control and their relationship to juvenile delinquency. However, the methodology and criminal activity examined vastly differs across studies. Moreover, each study indicates more specific factors such as attachment to parents, teachers, or school. In the independent variable columns, there are three codes given. The first code, “YES,” indicates that the study found a statistically significant relationship while the second code, “yes,” indicates an indirect effect between the dependent variable and the associated independent variable. The third code, “NO,” indicates that no statistically significant relationship exists, and the fourth code, “None,” indicates that the specific study did not test the relationship.

Hirschi’s (1969) social control theory emphasized that attachment to parents and parental supervision are one of the most pertinent variables in explaining juvenile delinquency. Additionally, children’s attachment to parents, as well as the level of supervision received by those parents, explain a significant amount of variance in both individuals’ likelihood to follow social norms his or her stakes in conformity (Toby, 1957). Thus, Hirschi (1969) argued that if strong bonds exist between parents and their child, the child will be more likely to care about others’ views of him or her. Furthermore, young people who possess this concern for others’ views are also less likely to commit criminal acts.
Table 3

*Prior Studies of Hirschi’s (1969) Social Control Theory*

<table>
<thead>
<tr>
<th>Author</th>
<th>Data Years</th>
<th>Place</th>
<th>Sample/(N)</th>
<th>DV</th>
<th>Attachments</th>
<th>Commitment</th>
<th>Involvement</th>
<th>Belief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiatrowski et al. (1981)</td>
<td>1966</td>
<td>USA</td>
<td>High School Students/</td>
<td>Juvenile Delinquency</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=2,213)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheung &amp; NG (1988)</td>
<td>1986</td>
<td>Hong-Kong, China</td>
<td>High School Students/</td>
<td>Deviant Behavior</td>
<td>School: yes</td>
<td>None</td>
<td>None</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=1,139)</td>
<td></td>
<td>Parents: yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheu (1988)</td>
<td>N/A</td>
<td>Northern, Taiwan</td>
<td>High School Students/</td>
<td>Status Offense</td>
<td>School: YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=3,717)</td>
<td></td>
<td>Parents: YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanioka &amp; Glaser (1991)</td>
<td>N/A</td>
<td>Osaka, Japan</td>
<td>High School Students/</td>
<td>Status Offense</td>
<td>Parents: YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=1,121)</td>
<td></td>
<td>Teacher: YES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoemaker (1994)</td>
<td>1987</td>
<td>Southern,</td>
<td>High School Students/</td>
<td>Juvenile Delinquency</td>
<td>Parents: YES</td>
<td>YES</td>
<td>None</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Philippines</td>
<td>(n=663)</td>
<td></td>
<td>School: NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Peer: NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Church: NO</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3 (continued).

<table>
<thead>
<tr>
<th>Author</th>
<th>Data Years</th>
<th>Place</th>
<th>Sample/(N)</th>
<th>DV</th>
<th>Attachments</th>
<th>Commitment</th>
<th>Involvement</th>
<th>Belief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zhang &amp; Messner (1996)</td>
<td>1988</td>
<td>Tianjin, China</td>
<td>Youth/(n=166)</td>
<td>Status Offence</td>
<td>Family: YES, School: YES</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Jenkins (1997)</td>
<td>1991</td>
<td>Delaware, USA</td>
<td>Middle School Students/(n=754)</td>
<td>School crime</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Drickson, Crosnoe, &amp; Dornbusch (2000)</td>
<td>1990</td>
<td>California &amp; Wisconsin, USA</td>
<td>High school students/(n=1,503)</td>
<td>Delinquency</td>
<td>Parents: NO, Teacher: YES</td>
<td>YES</td>
<td>NO</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Substance use</td>
<td>Parents: YES, Teacher: YES</td>
<td>YES</td>
<td>YES</td>
<td>None</td>
</tr>
<tr>
<td>Longshore et al. (2004)</td>
<td>1995</td>
<td>Five Cities, USA</td>
<td>Adult, Drug Offenders/(n=1,036)</td>
<td>Drug Use</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>
Table 3 (continued).

<table>
<thead>
<tr>
<th>Author</th>
<th>Data Years</th>
<th>Place</th>
<th>Sample/(N)</th>
<th>DV</th>
<th>Attachments</th>
<th>Commitment</th>
<th>Involvement</th>
<th>Belief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longshore et al. (2005)</td>
<td>1995</td>
<td>Southeastern, USA</td>
<td>Adolescent Offenders/</td>
<td>Juvenile Delinquency</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=359)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chapple et al. (2005)</td>
<td>1997</td>
<td>Pennsylvania, USA</td>
<td>Adolescent /</td>
<td>Property Crime</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=1,139)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cohen &amp; Zeira (1999)</td>
<td>N/A</td>
<td>Kibbutzim, Israel</td>
<td>Adolescent /</td>
<td>Juvenile Delinquency</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=440)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheung &amp; Cheung (2008)</td>
<td>2002</td>
<td>Hong Kong, China</td>
<td>Adolescent /</td>
<td>Juvenile Delinquency</td>
<td>Parents: YES School: NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=1,115)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=262)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(n=1,730)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: a) “YES” for significant strongly, b) “yes” for indirect effect, c) “NO” for not significant, d) “None” for not tested, e) N/A for not available.
At the present time, social control theory has been predominantly tested and developed in the United States, and thus is lacking generalizability. This is apparent within the limited scope of research examining social control in Asian cultures. Moreover, while Hirschi’s (1969) theory has rarely been studied in Asian countries, the studies that have been conducted demonstrate considerable support for the theory, including China (Cheung & Cheung, 2008; Cheug & Ng, 1988; Zhang & Messner, 1996), Turkey (Ozbay & Ozcan, 2009), Taiwan (Sheu, 1988), Philippines (Shoemaker, 1994), and Japan (Tanioka & Claser, 1991).

As can be observed in Table 3, the majority of studies that have examined the effects of social control on delinquency in Asian countries have found relatively similar results to those studies conducted in the United States. However, there appears to be a general consensus that the effects of attachment to parents has a much greater effect on juveniles in Asian countries than in the United States. In addition, all other social bonding factors (commitment, involvement, and belief) indicating similar findings.

Cheung and Cheung (2008) have argued that the applicability of social control theory as a means to explain juvenile delinquency is higher in Asian societies than in American societies. This may be explained by the emphasis on collectivism in Asian cultures; as the Asian culture provides “a context that differs in most cultural, social and demographic respects from the United States and Europe” (Cheung & Cheung, 2008, p. 416). Furthermore, while American culture focuses more on individualism, traditional Asian societies focus on the effects on society as a whole; thus, social forces may be more of an influence in juveniles’ decisions to circumvent deviant behavior (Cheung & Cheung, 2008). Although there is some support that South Korean culture has begun to
mirror American culture, familism and education continue to be the dominant influences of individual’s social decision-making (Cho & Shin, 1996; Kim, et al., 2005; Cheung & Cheung, 2008).

**Criticisms of Social Control Theory**

It is important to note that while Hirschi’s social control theory has become very popular in criminological literature it is not without its criticisms. One of the primary concerns of the theory has been the process of operationalizing each element of bond. Specifically, there have been concerns over the broad definitions of attachment, both within the behaviors of measuring attachment to various individuals and entities. Hirschi (1969) argued that the four elements create one factor and thus is a unidimensional measure of social bond. However, some studies have demonstrated that each element possesses identifiable amounts of shared variance, and thus, is a multidimensional measure (Kempf, Adler, & Laufer, 1993; Krohn & Messey, 1980; Marcos, Bahr, & Johnson, 1986). In fact, Hindelang (1973) argued that even the three elements of attachment (i.e., school, peers, and parents) are actually three distinct measures and that there is some empirical evidence that demonstrates a strong inverse relationship between attachment to peers and attachment to parents. After conducting a meta-analysis of 71 studies, Kempf et al. (1993) went as far as to say that the four elements are “essentially separate studies which have little relation to each other and fail to build on experience” (p. 173). While there has been a consensus that weakened bonds appear to increase the likelihood of deviant involvement, there have been concerns over the explanatory power of the theory. More specifically, Krohn and Messey (1980) argued that the theory fails to explain why some with weakened social bonds commit delinquency while others do not.
A General Theory of Crime

Twenty years after Hirschi published *Causes of Delinquency*, Hirschi abandoned his original theory, and along with Michael Gottfredson, in 1990, published *A General Theory of Crime*. Similar to Hirschi’s original theory, this theory was a social control theory; however, it examined the effects of *low self-control* on delinquent involvement; thus, the theory is now commonly referred to as “self-control theory.” Gottfredson and Hirschi (1990) argued that internalized control was the missing variable in Hirschi’s original model. Additionally, they purported that the role of the parents is the dominant factor in explaining the variance of self-control. Their theory is all encompassing that it not only applies to juvenile crime but is a general explanation of all delinquent behavior.

General theory of crime proposed two major arguments: (1) levels of self-control are established by parental control rather than biological or psychological factors and (2) this self-control should remain relatively stable over the life-course once established by age 8 to 10.

According to the first proposition, low self-control is developed through ineffective child rearing. It is argued that parents who put forth effort to maintain strong bonds to their children will more likely provide effective child-rearing, and thus, when those efforts are not made, the likelihood of ineffective child-rearing vastly increase. Gottfredson and Hirschi (1990) argued that in order to rear children effectively parents must closely monitor children, recognize when their child has committed a deviant act, punish the act correctly, and punish it in a timely manner. Children will be more likely to develop high self-control if their parents use these child rearing practices.
Conversely, individuals who develop low self-control are more likely to seek high-risk behavior. Individuals with low self-control are characterized as impulsive, insensitive, aggressive, exciting, thrilling, short-sighted, non-verbal, physical and self-centered (Gottfredson & Hirschi, 1990). Parents who are unable to regulate such behavior will have children that are more likely to engage in delinquent behavior.

According to Gottfredson and Hirschi (1990), these constructs can be measured through individual’s behaviors and that these behaviors can be used to explain levels of self-control. If an individuals’ behaviors demonstrate low levels of self-control it can be presumed that their propensity towards deviancy is likely. The theory’s emphasis on child-rearing is argued to explain all of the major family functions in crime, including neglect, abuse, single parent homes, maternal employment, family-size and parental involvement that is observably common among the family of offenders. Hirschi and Gottfredson (2001) argued that all of these familial variables are indirectly related to delinquency and that self-control was the missing mediating variable in Hirschi’s (1969) original social control theory.

In addition to the theory’s purported ability to explain all crime, the theorists also argued that one’s levels of self-control remains stable throughout the life-course after the age range 8 to 10. Gottfredson and Hirschi (1990) argued that low self-control is stable across the life-course; once established at age 8 to 10 it remain stable regardless of any life changes. In reference to the age/crime distribution, Gottfredson and Hirschi (1990) argued that criminal involvement varies during the life-course; however the differences in the tendency of criminality remain constant. Hirschi & Gottfredson (2001) stated that:
Children in trouble with teachers in the 2nd and 3rd grades are more likely to be in trouble with juvenile authorities at 15 and 16; they are more likely to serve prison terms in their 20s; they are more likely to have trouble with their families and jobs at all ages. (p. 87)

Gottfredson and Hirschi (1990) argued that low self-control is natural as humans are hedonistic: thus, controlling those desires is derived from effective child rearing, and the levels of such control remain constant over the life-course. According to Pratt and Cullen’s (2000) meta-analysis of twenty-one studies of self-control theory, a variety of methods have been employed to measure self-control. Most of the examined studies used attitudinal and behavioral measurements of low self-control employed cross-sectional analyses. Regardless of the measurements used the authors concluded that low self-control is an important predictor of crime and has been consistently related to criminal behavior.

Criticisms of the Self-control Theory

Presently, *A General Theory of Crime* is the most tested theory within criminology and, not surprisingly, is also one of the most criticized theories. While Gottfredson and Hirschi (1990) claim the theory explains all crimes, its explanations are inconsistent with white collar criminals (Perrone, Sullivan, Pratt, & Margaryan, 2004; Piquero, Macintosh, & Hickman, 2000). The theorists have also been criticized for failing to control for differences in gender and self-control, even though Gottfredson and Hirschi (1990) argued that their theory in and of itself accounts for the variance between males and females (Evans, Cullen, Burton, Dunaway, & Benson, 1997). Additionally, the theory has been argued to be tautological, as Gottfredson and Hirschi (1990) asserted that the
method to measure levels of self-control is through analogous behaviors of crime. Akers (1991) argued that the causal nature of the theory is invalid without some other method of assessing low self-control. Furthermore, it has been hypothesized that the lack of longitudinal studies that have examined self-control inflate the theory’s explanatory power and that cross-sectional research fails to examine the stability of self-control throughout the life-course (Cretacci, 2008).

The Stability of Self-control

Self-control theory is presently the most frequently tested theory in the field of criminology. However, most empirical studies have focused on the relationship between low self-control and delinquency (the first proposition of self-control theory), and there have been general consistent findings that support the proposition that self-control is significantly related to crime and delinquency (Pratt & Cullen, 2000). These studies, however, have been conducted using only cross-sectional data, and thus, there is limited research that has examined the stability of self-control throughout the life-course.

Researchers who have examined self-control’s stability have employed two different measures: absolute stability and relative stability. Absolute stability of self-control is tested by retrieving multiple measures of individuals’ levels of self-control throughout their lifetimes. These levels of self-control are theorized to be stable over time (Hay & Forrest, 2006). In other words, throughout an individual’s life-course his or her level of self-control at one age should mirror all other ages (Hay & Forrest, 2006).

Relative stability, however, focuses on the differences between individuals. Gottfredson and Hirschi (1990) argued that the differences between individuals’ levels of self-control should remain stable over the life-course. To explain further, if one individual
has low self-control at age ten, and another ten-year-old individual has high levels of self-control, the difference between those individuals should remain constant throughout the life-course regardless of any negative or pro-social changes (Burt, et al., 2006; Sampson & Laub, 1993). This is referred in this analysis as “between individual” differences.

To expand, Gottfredson and Hirschi (1990) argued that an individual’s own level of self-control, known as the absolute level of self-control, increases with age. Thus, although they purport that self-control is constant throughout the life-course, the theorists emphasized this stability represents differences between individuals (Hay & Forrest, 2006; Sampson & Laub, 1993). Therefore, Gottfredson and Hirschi (1990) fully assert that changes in individuals’ levels of self-control can change after age 8 to 10, yet the change should be relatively minor and insignificant. This explanation can be used to explain the rapid decrease in the age-crime curve; as an individual grows older, his or her level of self-control may increase, causing a decrease in his or her criminal activity. As previously stated, Gottfredson and Hirschi’s (1990) stability postulation primarily focuses on the constancy of the differences between individuals’ levels of self-control. This element of the A General Theory of Crime (1990) has been the focus of empirical tests on the theory; thus, few studies have focused on the changes in individuals’ levels of self-control throughout their life-course (Sampson & Laub, 1993). This analysis will primarily focus on how individuals’ levels of self-control change or remain constant throughout their life-course. The following studies are indicative of recent studies on the changes of individual levels of social control over time.

Arneklev et al. (1998) tested Gottfredson and Hirschi’s absolute stability (the longitudinal changes within individuals’ levels of self-control) of self-control. They
conducted a two-wave panel that measured levels of college students’ self-control from the fall semester to the spring semester. They found that most of the dimensions of self-control, as well as the overall construct of self-control remained relatively stable throughout the school year. The researchers reported a correlation coefficient of .82 between the two waves, demonstrating strong empirical support of the stability of self-control over a short period of time.

Raffaelli et al. (2005) tested the absolute stability of self-regulation by using three measures, including individuals’ ability to regulate their own actions, individuals’ ability to control emotional outbursts, and individuals’ ability to avoid temptation as well as control impulses. Although this measure is operationalized somewhat differently than measures of self-control, the theoretical implications are arguably the same. The researchers found that the levels of self-regulation were fairly stable between ages four to fourteen within individual differences ($r = .50$ to $r = .49$).

Winfree, Taylor, and Esbensen (2006) also conducted a longitudinal study that examined self-control’s stability over the life-course. The researchers used data from the National Evaluation of the Gang Resistance Education and Training Program (NEGRETP) that measured levels of self-control of offenders and non-offenders over a five-year period. The researchers found no significant stability of self-control over the five-year period. This plausibly demonstrates that cross-sectional data does inflate the explanatory power of self-control. Winfree et al. (2006) argued the lack of explanatory power could be due to a “more complex [relationship] than previously acknowledged” (p. 270).

Study (FACHS). This data included measures of self-control and delinquency from a population of African-American children ages ten to fourteen. Similar to previous empirical studies, the researchers found a relationship between low self-control and delinquent behavior. The researchers also tested the relative stability of self-control and found a correlation of .48 between the two waves. They concluded there was little evidence of stability in individuals’ levels of self-control. In fact, they reported that almost half of all participants reported a change in their self-control that moved their levels of self-control from one quartile to another.

Turner and Piquero (2002) expanded on Arneklev et al.’s (1998) study and examined both absolute and relative stability of self-control from early childhood to early adulthood by using behavioral and attitudinal measures of the latent traits of self-control. The reliability of the scale was very strong (\( \alpha = .89 \)); however, the reliability of the attitudinal scale was found to only be moderate (\( \alpha = .59 \)). Overall, their findings indicated that the “within-groups” stability was strongly related over time with a correlation coefficient ranging from .33 to .68. They contended that self-control increases with age for both offender and non-offender groups. However, the levels of self-control of offenders were significantly lower than non-offenders. Even though non-offenders reported a higher self-control score than offenders during childhood and into early adolescence, once the participants reached early adulthood, the trend reversed. The authors concluded that these findings neither consistently support nor refute the stability postulate.

Mitchell and MacKenzie (2006) examined the stability of self-control among incarcerated African Americans during a six-month period. The authors found no
empirical support for either absolute or relative stability of self-control. In fact, individuals’ levels of self-control decreased during imprisonment and the relative stability of self-control varied between the participants throughout the six months.

Contrary to previous findings, Hay and Forrest (2006) actually found strong evidence of both relative and absolute stability of self-control from national samples of United States children. Using five waves of data, the researchers analyzed levels of self-control through semi-parametric group-based models to identify distinctive patterns. They found that in 84% of their samples from National Longitudinal Study of Youth (NLSY), self-control remained relatively constant both within individuals and between individuals from age 7 to 15. They identified four trajectories of self-control, including very high-stable (12.4%), high-stable (41.7%), medium-stable (25.8%) and medium-decreasing (9.1%).

More recently, Beaver et al. (2008) examined the genetic and environmental influences on the stability of low self-control by using a sample of twins from the National Longitudinal Study of Adolescent Health (NLSAH). Although this contradicts Gottfredson and Hirschi’s (1990) original argument that self-control is developed through nurture not nature, Beaver et al. (2008) found that low self-control was moderately stable between wave one and wave two ($r = .64$). Additionally, the researchers found that while genetic factors did explain a moderate amount of change in self-control through the life-course, environmental factors were nonsignificant.

Table 4 provides a summary of eight studies conducted between 1998 and 2008 that examined the stability of self-control. The first five columns in Table 3 report the authors, publishing years, sample, age of study and data collection method. The last four
columns report number of measurements, time-span, statistical method employed and results of the study (the stability of self-control).

The theoretical relevance of these eight empirical studies is limited in a number of ways. First, many of the studies that examined stability of self-control had a short follow-up period. For example, Arneklev et al.’s (1998), Mitchell and MacKenzie’s (2006) and Beaver et al.’s (2008) studies used relatively short time spans between measurements. Thus, this may explain why other studies that examined the differences in self-control over a longer time period did not find empirical support for the stability postulation of self-control theory. Therefore, it is recommended that stability within self-control needs to be examined over a more extensive time period (Beaver, et al., 2008).

Through an examination of the literature, it can be concluded that while there is general empirical evidence of a significant relationship between low self-control and crime, empirical tests of self-control’s stability throughout the life-course has produced contradicting results. Therefore, at this present time, there is no general consensus on the stability of self-control throughout the life-course. An additional limitation of these studies can be observed within the operational definitions of self-control, as they vary across each study (Pratt & Cullen, 2000).

A number of studies have used the Grasmick scale (Grasmick, Tittle, Bursik, & Arneklev, 1993), which measures the perceptions of the six traits of self-control proposed by Gottfredson and Hirschi (1990), including: “impulsivity…preference for simplicity…risk seeking…physical as opposed to mental activity…minimal tolerance for frustration…and self-centered orientation,” (p. 90), while other studies used behavioral measures of the latent traits of self-control (Hirschi & Gottfredson, 1993).
Table 4

Summary of Empirical Studies of Stability of Self-control

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Ages</th>
<th>Data</th>
<th># of waves</th>
<th>Time Span</th>
<th>Stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arneklev et al. (1998)</td>
<td>College students</td>
<td>22 (mean age)</td>
<td>Primary data</td>
<td>2</td>
<td>4 months</td>
<td>Stable (A)</td>
</tr>
<tr>
<td>Turner &amp; Piquero (2002)</td>
<td>Youth</td>
<td>6-21</td>
<td>NLSY</td>
<td>7</td>
<td>12 years</td>
<td>Unstable (A) Mixed (R)</td>
</tr>
<tr>
<td>Raffaelli et al. (2005)</td>
<td>Youth</td>
<td>4-14</td>
<td>NLSY</td>
<td>3</td>
<td>8 years</td>
<td>Stable (A)</td>
</tr>
<tr>
<td>Mitchell &amp; MacKenzie (2006)</td>
<td>Incarcerated offenders</td>
<td>23 (mean age)</td>
<td>Primary data</td>
<td>2</td>
<td>6 months</td>
<td>Unstable (A &amp; R)</td>
</tr>
<tr>
<td>Burt et al. (2006)</td>
<td>Youth</td>
<td>10-14</td>
<td>FACHS</td>
<td>2</td>
<td>4 years</td>
<td>Unstable (R)</td>
</tr>
<tr>
<td>Hay &amp; Forrest (2006)</td>
<td>Youth</td>
<td>7-15</td>
<td>NLSY</td>
<td>5</td>
<td>9 years</td>
<td>Stable (A &amp; R)</td>
</tr>
<tr>
<td>Winfree et al. (2006)</td>
<td>Youth</td>
<td>10-14</td>
<td>NEGRET</td>
<td>5</td>
<td>5 years</td>
<td>Unstable (R)</td>
</tr>
<tr>
<td>Beaver et al. (2008)</td>
<td>Youth</td>
<td>10-15</td>
<td>NLSAH</td>
<td>3</td>
<td>2 years</td>
<td>Stable (A)</td>
</tr>
</tbody>
</table>

Note. All studies used Pearson r correlation. “A” refers to absolute; “R” refers to relative
Only Turner and Piquero (2002) used both behavioral and attitudinal measures of self-control. However, behavioral measures of low self-control have been criticized for contributing to the tautological nature of the theory (Hirschi & Gottfredson, 1993; Akers & Seller, 2004). While there have been arguments over the methodological inconsistencies, Pratt and Cullen (2000), however, argued that the effect sizes of attitudinal and behavioral measures of self-control are relatively equal. Thus, “undermines the criticism that support for Gottfredson and Hirschi’s theory lies primarily on data biased by the use of tautological measures” (Pratt & Cullen, 2000, p. 945).

Second, the sampling techniques employed for each study also limit the overall generalizability of the findings between empirical tests of self-control and their sampling techniques. For instance, Arneklev et al. (1998) used a sample of college students who traditionally are considered to have higher levels of self-control; thus, results may be negatively skewed. In contrast, Mitchell and MacKenzie (2006) only examined incarcerated African Americans offenders who have consistently demonstrated lower levels of self-control than other races; thus, results may be positively skewed. Lastly, in Turner and Piquero’s (2002), Mitchell and MacKenzie’s (2006) and Winfree, Taylor, He, and Esbensen’s (2006) studies, they examined the stability of differences between two groups: offenders and non-offenders. Generally, offenders were found to consistently have low levels of self-control throughout the life-course while non-offenders were found to consistently have higher levels of self-control throughout the life-course. However, there are various distinctive developmental patterns that further classify offenders and non-offenders in regards to the stability of self-control, such as late-onsetters, escalators and desisters (Chung, et al., 2002a; Fergusson, et al., 2000; Loeber, et al., 1991).
There has been empirical support demonstrating that the inclusion of these classifications would result in different outcomes in regards to the stability of individual self-control. Therefore, it is recommended that these various classifications should be accounted for within the model. Hay and Forrest (2006) attempted to identify the distinctive classification groups of trajectory patterns of self-control within certain individuals rather than identify the distinctive delinquent patterns, and then compare those differences. In other words, this study did not employ offender typologies but instead classified distinctive patterns from self-reported levels of self-control. Thus, the differences were examined within the stability of self-control and not in context of delinquent behavior.

Developmental (Life-course) Theories of Crime

Traditionally, theories of crime have been cross-sectional in nature. It is only in recent years that theories have begun to focus on how various social constructs affect individuals differently through the life-course, and how this may related to individuals’ propensity to commit deviant acts. Developmental theories of crime, also known as life-course criminology, are dynamic concepts that focus on longitudinal changes within individuals and how these affect changes in criminal activity. In recent years, there has been a substantial influx in empirical studies analyzing the validity of developmental theories using longitudinal data.

The first criminologists to examine the effects of life-course development on criminal activity were Sheldon Glueck and Eleanor Glueck in 1950. They collected data from 500 delinquents and 500 non-delinquent boys, ages 10 to 17. The researchers then surveyed the participants two more times over a span of seven years. The Gluecks (1950)
found moderate variation in criminal involvement and behavior within delinquent boys throughout the time-span, while non-delinquents boys’ behavior remained relatively stable. Sampson and Laub (1993, 2003) reconstructed Gluecks’ (1950) three-wave data (ages 14, 25, and 32) and followed the 500 delinquents boys in the sample until age 70 and conducted interviews with 52 of them. In their book, *Crime in the Making*, Sampson and Laub introduced a developmental perspective of delinquent behavior in their age-graded theory of informal social control (Sampson & Laub, 1993). Although previous research has found a strong relationship between social bonds and juvenile delinquency through cross-sectional data analysis, the question remained as to whether this relationship would be significant throughout the developmental life-course.

The dynamic features of age-graded informal social control explained developmental trajectories of crime throughout life-course. They examined not only the initial involvement in crime (onset) but also why people persist and desist from crime. The main element of their age-graded theory of informal social control is that the impact of the institutions of informal social control varies by age. Thus, the relationship between past and future offending is dependent on age-graded conventional bonds to social institutions such as family, school and work. In this regard, tests of persistence and desistance have been developed by other researchers (Giordano, et al., 2002; Maruna, 2001; Sampson & Laub, 1993).

Sampson and Laub’s (1993) age graded theory of crime influenced other theorists to examine the differences in criminal behavior throughout the life-course. The research has indicated that one of the imperative considerations in examining persistence and desistance from crime is through the developmental trajectories. The differences in the
groups’ onset and offset of criminal behavior can then be examined in the developmental context. Furthermore, when employing the developmental trajectory as a mediating variable, it can explain the dynamic, and seemingly indirect relationship of social bonds and criminal behavior (Laub & Sampson, 2003). In the context of the process of desistance from crime, the life-course framework introduces two interrelated components. The first component is the situational change of social bonds (for example, marriage, military and/or employment) as pro-social intimate relationships. These are conceptualized as fortuitous events (Laub & Sampson, 2003) and hooks for change (Giordano, et al., 2002).

The second component is recognition (motivation), meaning that the offenders must take advantage of opportunities. Motivation is measured through human agency (Laub & Sampson, 2003), cognitive transformation (Giordano, et al., 2002), and redemption scripts (Maruna, 2001). In other words, it is through pro-social events that desistance becomes inevitable. However, it is an individual’s motivation that most strongly affects the likelihood of desistance when pro-social events are introduced (Laub & Sampson, 2003; Giordno, et al., 2002; Maruna, 2001).

Variations in Juvenile Delinquent Behaviors

There has been a consensus that an age-crime curve exists within populations across most cultures, meaning that delinquent behavior escalates during early adolescence, peaks sharply in late adolescence, and then decreases in early adulthood (Moffitt, 1993; Loeber et al., 1991; Patterson, et al., 1991; Sampson & Laub, 2003). This is arguably due to the lack of freedoms, responsibilities, and resources adolescents have when compared to adults (Agnew, 2003; Moffitt, 1993). Although the age crime curve is
seemingly indisputable the method of explaining the age-crime curve is ongoing (Yessine & Bonta, 2008). Therefore, developmental theorists have attempted to explain why this period between late adolescence and early adulthood is the most dynamic period for criminal activity.

The majority of studies on crime have focused on differences between offenders and non-offenders, and therefore have not considered the possibility of other trajectories. Thus, there has been a recent emphasis on examining the differences within offender groups to identify distinctive delinquent patterns of developmental trajectories within these groups. However, this is a novel idea, and little research has been conducted that includes these distinct patterns. It has been recommended that “more research with multiple samples is needed in order to learn more about the generalizability of findings” (Wiesner & Windle, 2004, p. 432).

Over the past twenty years, longitudinal data has become more readily available; thus, the individual differences in delinquent behavior has received more attention. Specifically, there has been increased focus on the examination of risk factors associated with early developmental trajectories of crime and juvenile delinquency as well as how these change within each stage of adolescence. The first studies that examined these distinctions between individuals in developmental trajectories primarily focused on two major groups: early-onset persisters and late-onset desisters. Early-onset persisters, also known as life-course-persistent offenders (LCPs), are individuals who involve themselves in delinquent behavior at a young age and continue to commit crime throughout the life-course (Moffitt, 1993; Patterson, et al., 1991). Late-onset desisters, also known as adolescence-limited offenders (ALs), are individuals who begin their criminal behaviors
later in the life-course and desist from crime during later adolescence (Moffitt, 1993; Patterson, et al., 1991).

This typology was explained in both Moffitt’s (1993) and Patterson et al.’s (1991) studies. Moffitt (1993) argued that dynamic reciprocal relationships between individual traits (neuropsychological deficits) and social environmental factors could be explained through developmental processes in life-course persistent offenders. Adolescent-limited offenders, however, could possibly be explained by the “maturity gap,” which is the contradiction between biological traits and society’s expectations of acceptable behavior. Life-course persistent offenders attempt to hide these contradictions through social mimicry (imitation of behaviors); however, adolescent-limited offenders simply desist from socially unacceptable behavior. Moffitt (1993) suggested that early onset persisters are more likely to be involved in serious criminal offending, and that there is a greater likelihood that familial factors is the greatest predictor of individuals being early onset persisters.

More recently, developmental and life-course criminologists have extended this typology by focusing on distinctive groups of offenders among children. This process focuses on developing procedures to disaggregate the age crime distribution into a series of homogeneous groups that follow distinct offending trajectories (Fergusson, et al., 2000; Nagin, 1999). To further explain, there has been interest in examining the effects of multiple offender trajectories on the relationship between the developmental process and criminal involvement.

There has been a surge in research that has employed advanced multivariate statistics in an attempt to identify existing patterns of development trajectories on the age
crime curve. One of the leading advanced statistical methods is Nagin’s (1999) group-based developmental trajectories model, which can be analyzed with Statistical Analysis Software (SAS). Group-based developmental trajectory models allow for data to be classified into distinct subpopulations for each developmental trajectory (Nagin, 1999). According to his model, classification of homogeneous groups is based on patterns of characteristics over time. Using this method of identifying groups, Nagin and his colleagues attempted to find distinctive developmental trajectories in several other studies.

In 2000, Fergusson et al. identified four different trajectory groups, including non-offenders, moderate risk offenders, adolescent onset offenders, and chronic offenders. Chung et al. (2002a), using data from the Seattle Social Development Project (SSDP), found five different trajectory groups. In their study, participants ranging from age 10 to 18 were classified as non-offenders, late-onsetters, desisters, escalators, and chronic offenders. Current developmental trajectories studies have not only classified various patterns, but also have identified distinctive risk factors associated with corresponding developmental trajectories (Fergusson, et al., 2000; Chung, et al., 2002a; Moffitt, 1993; Sampson & Laub, 2003). Using a dynamic classification approach, Ayers et al. (1999) identified eight possible trajectories in juveniles ages 13 to 15. Dynamic classification places individuals into homogeneous groups based on changes in levels of delinquent behavior over time. Based on this dynamic classification, the stable group was then divided into four categories, including stable non-delinquents, stable lows, stable moderates, and stable highs. The unstable group was also divided into four categories, including starters/initiators, escalators, deescalators and desisters. This classification somewhat mirrored the groupings of delinquent behaviors used by Loeber et al.’s (1991)
dynamic classification of offenders where researchers classified seven groups that included stable nondelinquents, stable moderates, stable highs, starters, escalators, de-escalators and desistors at ages 12 to 13.

Application of LGM of Developmental Trajectories

As previously stated, most studies on juvenile delinquency have used cross-sectional data, which is a single assessment from one moment in time. Longitudinal data, which involves the repeated assessment of a single sample of individuals over time, can be used to examine relationships between adolescents’ delinquent behavior and various dynamic factors related to control theory over the life-course. Since longitudinal data has become more readily available, there has been a vast increase in empirical studies that focuses on the effects and changes of delinquent behavior in juveniles throughout the life-course, such as age of onset, persistence of antisocial behaviors (Moffitt, 1993), and desistence from crime (Giordno, et al., 2002; Maruna, 2001; Sampson & Laub, 2003).

In the past, studying developmental trajectories has not been feasible, since there has not been access to ample longitudinal research (Duncan, et al., 2010). This has allowed researchers to examine the age crime curve by classifying individual differences within both offenders and nonoffenders while also separating those into different trajectories of juvenile delinquents (Chung, et al., 2002a; Kreuter & Muthen, 2008; Moffitt, 1993; Sampson & Laub, 2003).

In order to determine trajectories that exist in accordance with developmental and life-course theories newer statistical techniques have been developed and employed. Due to the infinite number of possible research questions and different data structures, there is no single statistical procedure for the analysis of longitudinal data. As a result, a variety
of statistical models and methods have been developed and used (Duncan, et al., 2010). In order to examine developmental trajectories, latent growth curve modeling can be used within other statistical techniques such as structural equation modeling (Duncan, et al., 2010), hierarchical linear modeling, (Raudenbush & Bryk, 2002), and semiparametric group-based trajectory modeling (Nagin, 1999). All three modeling techniques have been used to assess longitudinal data and are an appropriate technique to identify distinctive trajectories of delinquent behaviors (Nagin, 1999). These statistical techniques allow for the estimation of the intercept (initial status) and slope (rate of change over time) by observing repeatedly measured variables of interest over time (Kline, 2005).

There are a number of studies that have assessed longitudinal data by applying Latent Growth Models (LGM) within Structural Equation Modeling (SEM). It is imperative to note that there are multiple models that can be measured within a latent growth model, and over the past decades these models have been employed in criminological studies. Curran et al. (1997) recommended that in order to examine whether variables change together over time, new time specific methods were needed to develop more complete understanding of individual differences. One of the strengths of the time-specific methods is its capacity to incorporate “time-varying covariates” (time-variant variables) to examine the impact of change from the developmental trajectory (Duncan, et al., 2010). Curran, Stice, and Chassi (1997) assessed data collected in four waves by using a time-specific method. In this study, they applied a multiple group latent curve model in the latent growth curve model to examine the effects of changes in marital status on alcohol use and how these differed within identified developmental trajectories. This model not only examined the influence of time-invariant variables but also
examined multiple measures of status change simultaneously with an estimation of the
normative growth trajectory over time (Duncan, et al., 2010; Kline, 2005; Raudenbush &
Bryk, 2002).

Researchers such as Dembo, Warenham, Greenbaum, Childs and Schmeidler
(2009), Windle (2000), and Curran et al. (1997) have extended the application of the
basic model of growth curve modeling within structural equation modeling. Dembo et al.
(2009) developed a two-part growth model in order to examine the impact of socio-
demographic characteristics and psychosocial factors on marijuana use over four time
points. These two-part growth models allowed for an examination of the relationship
between the decision to use marijuana and continued use while also assessing the various
patterns that exist between age and other psychosocial variables. LGM modeling allows
for the estimation of nonlinear trends by adding a quadratic (squared) latent growth factor
enabling analysts to assess a curvilinear relationship that may exist within one or more of
the developmental trajectories (Kline, 2005). To further explain, Windle (2000) used a
quadratic LGM model to examine age-related adolescent delinquent activity with four-
wave longitudinal data. This study found that there was an increase in delinquency
between time one and time two, a sharp peaked increase in time three, and then a sharp
decrease in time four. This quadratic LGM model allowed for analysis of the age-crime
curve that consistently has been found in previous studies (Moffitt, 1993, Sampson &

Summary

The literature has demonstrated there are four existing issues in the study of
developmental trajectories of juvenile delinquents in South Korea: an increase in juvenile
delinquent crimes, importance of parental function in the South Korean family culture, variability of juvenile delinquent patterns, and the stability of self-control. Therefore, this chapter examined the relevant literature of Hirschi’s two control theories: social control theory (Hirschi, 1969) and self-control theory (Gottfredson & Hirschi, 1990). According to the overview of each theory, attachment to parents and individuals’ levels of self-control have been considered factors that explain the most variability of individual differences on delinquent behavior over time.

Additionally, this chapter addresses the importance of studying individual differences by focusing on the theoretical connection between control theories and developmental (life-course) theory. Lastly, studies that have employed use of latent growth curve modeling regarding developmental growth trajectories were assessed. Through a review of the literature, it is clear that there is a gap in understanding the onset and desistance of crime within juvenile populations outside of the United States. Therefore, it is the aim of this study to examine the developmental trajectories of juveniles within South Korea, in regards to typologies of offenders, as well as self-control and social control, to determine if these life-course theories are applicable to other populations. If so, this can vastly increase the generalizability and the validity of life-course criminological theories.
CHAPTER III
METHODOLOGY

Data

For this study, data from the Korea Youth Penal Study (KYPS) was used to assess the relationship between juvenile delinquency and social and self-control. This analysis examined how the elements of social control affect changes in behavior over a five-year period. This data was collected by the National Youth Policy Institution of South Korea for Youth Development, a government-funded research institute under the direction of the Office of the Prime Minister. This was a six-year longitudinal study first given to students in their second year of junior high school, as well as the parents of those participants. The survey was conducted through personal interviews in order to understand their changing pattern of various attitudes or behaviors regarding potential youth career options, future youth career choice and preparation, deviance, and participation in leisure activities over a six-year period. Additionally, a telephone survey was conducted of the participants’ parents for additional background information on each student. This study began in 2003 and surveyed the participants every year for five years thereafter.

The study used a stratified multi-stage cluster sampling technique. Participants were recruited from 104 junior high schools across twelve major cities in South Korea. In the present study, wave six was excluded because most participants had graduated high school and entered college, meaning behavior previously considered to be minor offenses were no longer classified as delinquent behavior. Therefore, this study examines the five-wave panel that measured the aforementioned variables of all participants from ages 15 to 19. Almost 3,000 students and their parents participated in the first year of study. Of those participants, 86% (2,552 students) remained over the five years. In this study, 27.8% (709)
of participants are missing across all variables. The final sample size for this analysis is 1,843 adolescents. Each respondent contributed five-repeated measures with the total number of observations being 9,215 units.

Measurement of the Variables

Dependent Variable

The dependent variable employed in this study is juvenile delinquent behaviors. To measure delinquent behaviors information on juvenile delinquent crime was assessed through self-reports and personal interviews of each student collected annually from 2003 to 2007. Specifically, the dependent variable was measured by responses to the question: “Have you committed delinquent acts in the past year?”, and “If yes, how many times have you committed each of the following thirteen delinquent behaviors in the past year?”

The participants reported how frequently they had been involved in delinquent acts over the past twelve months. These thirteen delinquent behaviors included smoking, drinking, having unexcused absences, running away from home, having sex, severely beating other people, fighting, robbing, stealing, severely teasing or bantering other people, threatening other people, collectively bullying, and sexually assaulting or harassing. These items were then recoded as weighted variables by the seriousness of the offense as determined by the offense seriousness scale. This offense seriousness scale was classified into four categories to reflect degrees of seriousness. Similar offense seriousness scales are applied in several studies (Ayers, et al., 1999; Chung, et al., 2002a; Loeber, et al., 1991). Based on the level of serious offenses adolescents were classified into one of the following four levels of juvenile delinquency:
(1) Level 0: No offenses committed.

(2) Level 1: Limited involvement to minor offenses such as smoking, drinking, having unexcused absences, running away from home, and having sex.

(3) Level 2: Moderate offenses, such as collectively bullying, fighting, teasing or bantering, and threatening other people.

(4) Level 3: Serious offenses such as severely beating other people, robbing, stealing, and sexual assaulting or sexual harassing.

The same offense seriousness scale is used to classify the most serious delinquent behavior that subsequently occurred each year thereafter. For example, individuals who report both level 1 and level 3 offenses are considered to be a level 3 offender.

**Independent Variables**

The independent variables measured were three time-invariant predictors (time-stable covariates), including gender, family monthly income, and maternal employment. Additionally, attachment to parents and self-control, which are time-variant, were also included as independent variables. Time-invariant variables were measured from the first wave as static values. However, the time-variant variable was continuously assessed for each wave. The specific independent variables are as follows:

**Time-variant variables.**

Low Self-control: *A General Theory of Crime* (Gottfredson & Hirschi, 1990) asserts that individuals with low self-control can be operationalized by measuring impulsivity, insensitivity, risk-taking, short-sightedness, physical activity, and temper. Levels of self-control were measured by using a self-report questionnaire and responses were given on a 5-point Likert scale, ranging one (*strongly disagree*) to five (*strongly agree*).
To measure low self-control, six items are used as unidimensional factor. The items include:

(a) “I jump into exciting things even if I have to take an examination tomorrow.”
(b) “I abandon a task once it becomes hard and laborious to do.”
(c) “I am apt to enjoy risky activities.”
(d) “I enjoy teasing and harassing other people.”
(e) “I lose my temper whenever I get angry.”
(f) “I don’t do my homework habitually.”

Attachment to parents: Attachment variables were measured based on relationships with respondents’ parents that included family interaction and supervision, support, care and trust, and communication. This was measured through a five-point Likert scale, ranging one (strongly disagree) to five (strongly agree). The participants were asked how much they agreed or disagreed with following six items.

(a) “My parents and I try to spend much time together.”
(b) “My parents always treat me with love and affection.”
(c) “My parents and I understand each other well.”
(d) “My parents and I candidly talk about everything.”
(e) “I frequently talk about my thoughts and what I experience away from home with my parents.”
(f) “My parents and I have frequent conversations.”

*Time-invariant variables.*

Gender was assessed using a dichotomous measure (male=0, female=1). Maternal employment status was recoded as a dichotomous measure (employed=0, unemployed=1). Family monthly income was used as a continuous variable.
Research Questions and Hypotheses

This analysis uses multivariate latent growth curve model techniques and will be guided by seven research questions in order to understand the distinctive trajectory patterns as well as examine other possible factors that are associated with patterns of juvenile delinquency.

(1) Are there distinctive patterns of delinquent behavior during adolescence?
(2) What are the characteristics of the trajectories of juvenile delinquency?
(3) Are there any other time-invariant predictors associated with certain patterns of delinquency over time, such as maternal employment, family income, and gender?
(4) Are there any other time-variant predictors associated with certain patterns of delinquency over time, such as self-control and attachment to parents?
(5) Are there interdependency effects between parental attachment and self-control on juvenile delinquency?
(6) If the sample contains distinctive patterns of offending, do the levels of self-control remain stable over time?

In the period of adolescence, the most dynamic period for delinquent crime and deviance, differences in juvenile delinquent trajectories may be explained by variance in levels of self-control and attachment to parents. Thus, in addition to the research questions there are ten research hypotheses that will be tested.

The following hypotheses (H1 through H3) examine independent variables as time-invariant variables that measured from the first wave.
H1: Gender is significantly related to delinquency over time.
H2: Family monthly income is significantly related to delinquency over time.
H3: Maternal employment is significantly related to delinquency over time.

The following hypotheses (H4 through H6) examine attachment to parents and the levels of self-control as time-variant variables that measured over the five years.

H4: Parental attachment is significantly related to delinquency over time.
H5: Self-control is significantly related to delinquency over time.
H6: There is indirect effect of parental attachment on juvenile offending through self-control.

The following hypotheses (H7 through H10) examine the stability of self-control measured over the five years.

H7: The levels of self-control within individuals are stable over time in the stable group of juvenile offenders.
H8: The levels of self-control between individuals are stable over time in the stable group of juvenile offenders.
H9: The levels of self-control within individuals are varying over time in the unstable groups of juvenile offenders.
H10: The levels of self-control between individuals are unstable over time in the unstable groups of juvenile offenders.

Data Analysis

Analytical Strategy

Latent growth curve modeling (LGM) allows for analyzing potential risk factors and the differences in how behaviors change over a certain time-period. Basically, this
model provides a means of modeling development as a repeated measure variable over time. One of the key advantages of LGM is its ability to assess the individual traits that may indirectly affect juvenile delinquent behavior through developmental trajectories. LGM combines elements of confirmatory factor analysis (CFA), repeated measure multivariate analysis of variance (MANOVA), and structural equation modeling (SEM) to assess developmental trajectories (Kline, 2005; Duncan, et al., 2010). Statistical techniques within the SEM framework allow for the estimation of the intercept (initial value) and slope (degree of change) of a repeatedly measured variable of interest (Kline, 2005). Kline (2005) introduced several assumptions for analysis of LGM in SEM as follows:

1. The dependent variable should be measured at least three times.
2. This dependent variable should be continuous.
3. The same units should be measured at each point in time.
4. The same construct should be measured at each assessment.
5. The data should be obtained at the same time and intervals.

Latent growth curve modeling is an appropriate statistical technique for this particular study, as it allows the analyst to examine the effects of individual differences throughout time while also examining how those individual differences may change through various developmental trajectories (Kline, 2005). Recently, the original LGM (Kline, 2005) was extended to be able to test other hypotheses through its ability to include time variant and invariant variables within one model.

One of the expansions of the use of the basic latent growth model, according to Curran et al. (1997), are multivariate latent growth curve models which can examine the
effects of both dependent and independent variables as time variant variables while also assessing these effects in context of the developmental trajectories. Curran and his colleagues (1997) applied multivariate latent growth modeling to examine the relationships between alcohol use and marital status as time-varying predictors through the classified developmental trajectories. This extended model provides a powerful statistical method for analyzing predictors as time-variant variables. In a LGM, time-varying predictors are themselves repeated measures typically measured at the same intervals as the indicators of the latent growth factors (Kline, 2005). Additionally, this model provides a more dynamic assessment of the correlates of individual differences and how those changes over time can be associated with development in another variable (Duncan, et al., 2010).

In this study, Amos 16.0 was used to examine the aforementioned hypotheses. In order to evaluate potential predictors that account for variation in the parameters of juvenile delinquency over time, multivariate latent growth curve modeling was used. This statistical method was specifically employed to examine the influence of changes in self-control on the developmental growth trajectory of delinquent behavior in South Korean Juveniles. Data analysis was conducted in two stages: (1) using dynamic classification (Loeber, et al., 1991) identify developmental trajectories of offenders and (2) apply a series of multivariate latent growth curve models based on identified developmental trajectories.

Stage 1

The main purpose of this stage is to identify distinctive patterns of juvenile offending among South Korean Youth using similar methods of grouping as Loeber et
al.’s (1991) dynamic classification of offenders. According to Loeber et al.’s (1991) classification, Korean Youth panel data can be used to identify numerous possible offense patterns. In order to reduce possible trajectory patterns, unobserved heterogeneity in the development of self-reported delinquent behavior was classified into two groups, stable and unstable, which are based on the aforementioned research questions and hypotheses of this study. For the stable group, participants were classified by whether they consistently or inconsistently committed deviant acts. If participants report increasing or decreasing the levels of seriousness of offending over time from wave one through five, these participants was classified into the unstable group and lastly, the unstable group will be divided into two groups, late-onsetters and desisters.

Stage II

In the second stage, this study was applying multivariate latent growth curve models on the best-fitting unconditional models estimated in the first stage. This was conducted to identify sub-classifications of South Korean adolescents within distinct offending trajectories. Based on the results of the first stage’s classification, separate stable and unstable groups were applied to the latent growth curve model. The multivariate latent growth curve model in this analysis was advanced in three steps:

Step I: Figure 2 illustrates a basic latent growth curve model, as a five-indicator, two-factor growth model of juvenile delinquent behavior over the five points in time without independent variables. As shown in Figure 2, the factor loadings for the five repeated measures of delinquent behavior on the latent intercepts factor were fixed to one to represent the initial starting point of the juvenile offending. The factor loadings for the five measurements of delinquent behaviors on the latent slope factor were fixed to zero,
one, two, three and four because the slope factor represents the overall shape of the delinquent behavior growth trajectory over time. This model examined growth trajectories of juvenile offending for individual variability in change over time.

Figure 2. Step I: A basic latent growth model.

Step II: As shown in Figure 3, model one was extended to include the main effects of gender, family income, and maternal employment as time-invariant variables as these effects may change over time in the prediction of the intercept and slope factors. This model examined the main effect of possible factors that are associated with distinctive patterns of juvenile offending.

Figure 3. Step II: Latent growth model including time-invariant variables.
Step III: As shown in Figure 4, model two was extended to include attachment to parents and self-control as time-variant variables (time-varying covariate) to explore whether changes in individuals’ levels of self-control and attachment to parents will affect juvenile offending. Furthermore, additional parameters are included in order to explain indirect effect between parental attachment and self-control on juvenile delinquency.

**Figure 4.** Step III: Latent growth model including time-varying covariates.

This study estimated all models by using maximum likelihood estimation. Traditional three model fit indices will be used to assess the overall goodness of fit of each model: (1) the chi-square statistic ($\chi^2$), (2) the comparative fit index (CFI), and (3) the root-mean-square error of approximation (RMSEA) with a 90% confidence interval (CI). The chi-square statistic assesses the “badness of fit” of the model and is extremely sensitive to sample size. Therefore, the CFI also used to assess model fit, which tests the
new model against the null model of uncorrelated independent variables, and assessed, using chi-square, the fit of the new model. It controls for chi-square’s sensitivity to sample size by accounting for the sample of the model (Duncan, et al., 2010). The RMSEA allows for “the construction of confidence intervals, which provide more information than the hypothesis test because the interval estimate indicates the degree of precision of the sample value of the index” (MacCallum, Browne, & Sugawara, 1996, p. 130). According to Kline (2005), a non-significant chi-square, accompanied by a CFI of no less than .95 and a RMSEA of no more than .05 (values falling below .08 are considered adequate), typically indicates good fit.

In sum, a series of multivariate latent growth curve model techniques guided by nine research hypotheses were examined through two stages. The first stage focuses on identifying distinctive trajectory patterns using by Loeber et al.’s (1991) dynamic classification of offenders. The second stage examined hypothesis one through nine by applying a serious of multivariate latent growth curve modeling. Hypotheses one through three were tested by examining the main effect of possible factors as time-invariant variables that are associated with distinctive patterns of juvenile delinquency (see Figure 3). By adding time-varying covariates, the next two hypotheses (hypothesis 4 and 5) examined influence of self-control and attachment to parents on juvenile delinquency as time-variant variables (see Figure 4). Last four hypotheses (hypothesis 6 through 9) were examined correlations to test stability of self-control. For overall model fit evaluation, each model’s fit was analyzed by using the chi-square statistic ($\chi^2$), the comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA) with a 90% confidence interval (CI).
Limitations

There are some limitations of this study that should be noted. One of the primary concerns derives from using secondary data, as the researcher was limited to the variables used for the original study. Thus, there are some distinct differences in operationalization of variables from the data being used and the variables that have been used in past self-control studies. An additional limitation derives from analyzing self-report data. The Korea Youth Penal Study (KYPS) data was only collected annually, yet participants were asked to report the frequency of their behaviors over the past year. This can result in inaccurate and invalid results.

Lastly, this study examined the five-wave panel that measured participants’ from age 15 to 19. This follow-up survey did not measure individuals’ behaviors before age 8 to 10, which, according to Gottfredson and Hirschi (1990), is the ages that one’s level of self-control is permanently established. This study only examines the stability of self-control of individuals from age 15 to 19. Further discussions of the limitations of the study are provided in Chapter V.

Summary

In order to assess the effects of social control and self-control on delinquent behavior throughout the life-course, data from the Korea Youth Penal Study was analyzed. This study identified distinctive patterns of juvenile delinquency to explain the trajectories of individuals’ growth or change. Individuals who possess similar patterns of behavior were classified into distinctive groups. Based on these distinctive group patterns multivariate latent growth curve models were employed to examine the main effects of gender, family monthly income, and maternal employment as time-invariant variables. In addition, this study assessed how levels of self-control and attachment to parents change
or remain constant in each individual as time-variant variable. The constancy of these variables was examined at each wave to determine if the effects of variables remain constant throughout the five-year period. Furthermore, this study applied correlations coefficient to assess stability of self-control.
CHAPTER IV
RESULTS

Data from Korean Youth Panel Study (KYPS) were analyzed with the following central goals in mind: (1) identify distinctive patterns of juvenile delinquency in order to explain the trajectories of individuals’ growth or change, (2) analyze the Pearson correlation coefficients of self-control to assess both the absolute and relative stability between each wave of the data over the five-year period, and (3) report the results of testing the hypotheses.

Characteristics of Participants

In order to assess the aggregate characteristics of all participants included in the study, descriptive statistics were derived for all time-variant and time-invariant variables included in the models. The time-invariant predictors (time-stable covariates) that were measured include gender, family monthly income, and maternal employment. The measures of these variables were taken from the first wave of data. The time-variant variables (time-varying covariates) that were measured include attachment to parents and low self-control. Descriptive statistics were assessed for all five years for both attachment and low self-control.

*Time-invariant Variables (time-stable covariates)*

As shown in Table 5, 901 of the participants (48.9%) were male and 942 of the participants (51.1%) were female. Furthermore, over half of the participants’ mothers worked outside of the home (50.6%). The mean family monthly income was $2,497.30
(SD = 1,619.47), with approximately 4% of the sample reporting family monthly income less than $800.00.¹

Table 5

*Time-invariant Variables (Demographic Characteristics)*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>901</td>
<td>48.9</td>
</tr>
<tr>
<td>Female</td>
<td>942</td>
<td>51.1</td>
</tr>
<tr>
<td>Maternal employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>933</td>
<td>50.6</td>
</tr>
<tr>
<td>Not employed</td>
<td>910</td>
<td>49.4</td>
</tr>
</tbody>
</table>

Note. Data from the Korea Youth Panel Study (KUPS, 2005-2009) (n = 1,843)

*Time-variant Variables (time-varying covariates)*

The descriptive statistics of the mean of low self-control and parental attachment scores as time-variant variables for the five waves are provided in Table 6. The levels of both attachment to parents and low self-control were measured by using a self-report questionnaire (each variable was composed of six items). They were measured on a 5-point Likert scale from 1 (*strongly agree*) to 5 (*strongly disagree*). Participants’ scores for parental attachment were calculated as the sum of the six items, ranging from a score of 6 to 30, with higher scores representing higher levels of parental attachment and lower scores representing lower levels of parental attachment.

¹ Korean currency “won” was calculated to “dollar” based on a daily exchange rates basis on December 9, 2011.
Similarly, the possible range of low self-control scores was between 6 and 30, with higher scores indicating higher levels of self-control, and lower scores indicating lower levels of self-control.\(^2\) As shown in Table 6, the mean levels of low self-control within the five waves of data ranged from 20.13 to 20.27 (SD ranged from 3.92 to 4.01) and the levels of attachment to parents ranged from 20.04 to 21.09 (SD ranged from 4.35 to 4.67).

Table 6

**Descriptive Longitudinal Analysis of Time-variant Variables across Five Waves**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-control</td>
<td>Mean 20.25</td>
<td>20.13</td>
<td>20.25</td>
<td>20.32</td>
<td>20.27</td>
</tr>
<tr>
<td></td>
<td>SD 3.97</td>
<td>4.01</td>
<td>3.98</td>
<td>3.88</td>
<td>3.92</td>
</tr>
<tr>
<td>Attachment to parents</td>
<td>Mean 20.04</td>
<td>20.50</td>
<td>20.61</td>
<td>20.75</td>
<td>21.09</td>
</tr>
<tr>
<td></td>
<td>SD 4.67</td>
<td>4.55</td>
<td>4.35</td>
<td>4.51</td>
<td>4.61</td>
</tr>
</tbody>
</table>

Note. Data from the Korea Youth Panel Study (KYPS, 2005-2009) (n = 1,843)

Table 7 presents the frequencies for juvenile delinquency (the offense seriousness scale), which ranges from zero to three over the five-year period. As noted in Chapter III, individuals who report both level 1 and level 3 offenses are considered to be a level 3 offender. Of the 1,843 participants, 459 students reported that they did not commit any levels of delinquent behavior over the five-year period. This group represents about 25% of the sample. In contrast, 1,384 (75.1%) of the participants reported being involved in at least one of the thirteen possible delinquent behaviors over the five-year period.

\(^2\) The measure of low self-control from the original data was coded to indicate that higher values indicate lower levels of self-control, thus the scoring was reversed on items.
Table 7

Descriptive Longitudinal Analysis of Juvenile Offending across Five Waves

<table>
<thead>
<tr>
<th>Waves</th>
<th>Seriousness Scale</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Age 15)</td>
<td>0</td>
<td>1,119</td>
<td>60.7</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>263</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>232</td>
<td>12.6</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>229</td>
<td>12.4</td>
</tr>
<tr>
<td>2 (Age 16)</td>
<td>0</td>
<td>1,223</td>
<td>66.4</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>415</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>73</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>132</td>
<td>7.2</td>
</tr>
<tr>
<td>3 (Age 17)</td>
<td>0</td>
<td>1,140</td>
<td>61.8</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>569</td>
<td>30.9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>67</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>67</td>
<td>3.6</td>
</tr>
<tr>
<td>4 (Age 18)</td>
<td>0</td>
<td>1,068</td>
<td>58.0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>671</td>
<td>36.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>41</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>63</td>
<td>3.4</td>
</tr>
<tr>
<td>5 (Age 19)</td>
<td>0</td>
<td>894</td>
<td>48.5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>865</td>
<td>46.9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>36</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>48</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Note. Offense seriousness levels 0 = non-offense; level 1 = minor offense such as smoking, drinking, having unexcused absences, running away from home, and having sex; level 2 = moderate offense such as collectively bullying, fighting, teasing or bantering, and threatening other people; level 3 = seriousness offense such as severely beating other people, robbing, stealing, and sexual assaulting or sexual harassing; (n = 1,843).

Moreover, the number of participants who initially reported committing only a minor offense sequentially increased over time; the first year only 14% of participants reported committing a minor offense; yet at wave five, almost half (46.9%) reported committing a minor offense that year. The number of participants who were classified as a level 2, meaning they reported committing a moderate offense, actually decreased from
232 (12.6%) at wave one to 36 (2.0%) at wave five. Similarly, the number of participants who reported committing a serious offense (level 3) decreased from 263 (14.6%) at wave one to 48 (2.6%) at wave five.

Figure 5 provides a graphical illustration of these results, displaying the five-year trend of participants’ offenses in regards to the offense seriousness scale. As shown in Figure 5, the number of participants in the non-offense category (Level 0) slightly increased from age 15 to age 16 and slightly decreased thereafter. The number of participants in the minor offenses category (Level 1) sharply increased from age 15 to 19. However, the frequency of participants who initially reported committed moderate offenses (Level 2) sharply decreased from age 15 to age 16 and continued to moderately decrease from age 16 to age 19. Lastly, the number of participants in the serious offenses category (Level 3) demonstrated a similar pattern as the moderate offenses category; from age 15 to age 17, there was a sharp decrease and subsequently a moderate decrease.
In other words, while there was a continual increase in the frequency of minor offenses committed, there was a consistent decrease in violent and property crimes committed.

First Goal of the Study

The first goal of the analysis is to determine if there were distinctive patterns of juvenile delinquency that could be identified, and if so, to examine the effects of these patterns over time using latent growth modeling (LGM). The first goal of the study employed a two-stage process: the first was attempting to identify distinctive patterns, and once identified, to conduct a series of latent growth models to examine the developmental trajectories in each pattern of juvenile offending over time.

Stage I: Identifying Trajectories of Juvenile Delinquency

The primary purpose of the first stage of analysis is to determine whether distinctive patterns of juvenile delinquency among South Korean adolescents could be identified and to assess what these patterns represented. In order to accomplish this, a dynamic classification of offenders was employed (see Ayers, et al., 1999; Loeber, et al., 1991). This study particularly focused on Loeber et al. ’s (1991) dynamic classification of offenders, which classified the patterns of juvenile offending by the variability in seriousness levels of offending over time.

By applying Loeber et al. ’s classification, it was determined that Korean youth panel data could produce 1,024 possible combinations of offense patterns. This was because the classification scheme is designed to capture all possible changes in levels of offense seriousness scale across five points in time. In order to reduce the number of

3 In general, the total number of possible patterns is calculated by the Multiplicative Law of Probability, meaning the same events “P” (four levels of offense classification) occur repeatedly (five points in time). Thus, five waves of a repeated measure of juvenile delinquency within a four-category of offense classification (0 to 3) can produce 1,024 possible offense patterns. The total possible number of patterns are: $P(4) \times P(4) \times P(4) \times P(4) \times P(4) = 1,024$. 
patterns, four mutually exclusive trajectories were constructed. The 1,024 patterns were
collapsed into one of four groups (i.e., non-offenders, late-onsetters, stable offenders, and
desisters). The classification was contingent on the participants’ pattern of delinquent
involvement. The four patterns were: (1) non-offense, (2), onset or initial involvement, (3)
persistence (continuance of involvement of juvenile delinquency), and (4) desistence
(discontinuance of involvement of juvenile delinquency once initiated).

Findings from developmental studies have suggested there are clearly identifiable
differences in offense trajectories during adolescence because it is the most dynamic for
involvement in delinquent acts (Yessine & Bonta, 2008). While these four patterns mirror
past studies to some degree (Ayers, et al., 1999; Chung, et al., 2002a; Chung, Hill,
Hawkins, Gilchrist, Nagin, 2002b; Loeber, et al., 1991), the trajectories were identified
and labeled differently. The stable offender group within this study generally mirrors the
“chronic offenders” group or the “escalators” group described by Chung et al. (2002a &
2002b); however, these patterns were consistently defined as adolescents who continued
offending during the adolescence period (e.g., Ayers, et al., 1999; Chung, et al., 2002a &

Furthermore, the “late-onsetters” group identified in this study is similar to the
“starters” group described by Loeber, et al. (1991), as well as the “initiators” group
described by Ayers et al. (1999), respectively. These patterns were consistently defined as
adolescents who experienced early onset but did not desist from offending during the
adolescence period (e.g., Ayers, et al., 1999; Loeber, et al., 1991). The desister group in
this study is similar to the “de-escalator” group described by Ayers et al. (1999). These
patterns were consistently defined as delinquency decreased in the level of offense
seriousness during the adolescence period (e.g., Ayers, et al., 1999; Loeber, et al., 1991). Based on the four levels of offense seriousness scale (0 to 3) across the five points in time, the group patterns were operationalized as follows (adolescents were assigned to one of the four distinctive trajectory patterns):

1. Non-offenders: this pattern was comprised of adolescents who had consistent non-involvement in delinquency through all five waves.

2. Stable offenders: this pattern included adolescents who had some levels of consistent involvement in delinquency through all five waves.

3. Late-onsetters: this pattern was composed of adolescents who did not commit delinquent offending at wave one, but became involved in delinquent behaviors from wave two through wave five (Chung, et al., 2002a & 2002b). Individuals are not involved in any offending in wave one.

4. Desisters: this pattern consisted of adolescents who reported committing delinquent offending at wave one but then desisted between wave two through five (Chung, et al., 2002a & 2002b). Individuals are not involved in any offending in wave five.

A summary for the four identified trajectories of juvenile delinquency is illustrated in Figure 6. Finally, 1,743 (94.6%) adolescents were included in the analysis. One hundred adolescents (5.4% of the sample) could not be classified into one of the four trajectories, and thus, were excluded from the analysis. It can be observed that the stable offender group comprised approximately 17% (n = 305) of the sample. Furthermore, the non-offender group comprised approximately 25% (n = 459) of the sample, while the largest group of adolescents was the late-onsetter group, comprising
approximately 32% of the sample \((n = 596)\). Lastly, around 21% \((n = 383)\) of the participants were classified as desisters.

![Figure 6](image)

**Figure 6.** Predicted adolescent offending trajectories among South Korean youth 15 to 19 years old.

Figure 6 provides a graphical illustration of the four identified trajectories of juvenile offending over the five-year period. It shows the observed trajectories of the mean juvenile offense seriousness at each age for all four groups. The non-offender group is comprised of those adolescents who had never reported juvenile offending to any seriousness levels of offending. The late-onsetter group of offenders reported no involvement in delinquent offenses at the first wave, however, then increased steadily to 1.1 in mean levels of seriousness offending. The desister group pattern reported moderate offending (1.9) in offending at age 15, but that involvement sharply decreased from age 16, continuously decreasing until age 19, where these participants reported no involvement in delinquent acts. Lastly, those in the stable offender group pattern
consistently maintained a seriousness level between 1.3 and 2.0 in the mean levels of seriousness offending throughout the adolescent period even though the trajectory was gradually decreased.

**Gender Composition within the Trajectories**

Through an examination of the Korean youth panel data and by employing Loeber et al.’s (1991) classification scheme, four developmental trajectories were identified (see Table 8). These four group models were then categorized into two stable groups (i.e., non-offenders and stable offenders) and two unstable groups (i.e., late-onsetters and desisters). Approximately 42% of participants were classified as stable and approximately 53% as unstable.

Table 8

**Characteristics of Offending Trajectory Groups by Gender**

<table>
<thead>
<tr>
<th>Offending Trajectory Groups</th>
<th>Stable Groups</th>
<th>Unstable Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n = 764$ (41.5%)</td>
<td>$n = 979$ (53.1%)</td>
</tr>
<tr>
<td>Non-offenders</td>
<td>$n = 459$ (24.9%)</td>
<td>**</td>
</tr>
<tr>
<td>Offenders</td>
<td>$n = 305$ (16.6%)</td>
<td>**</td>
</tr>
<tr>
<td>Late-onsetters</td>
<td>$n = 596$ (32.3%)</td>
<td>**</td>
</tr>
<tr>
<td>Desisters</td>
<td>$n = 383$ (20.8%)</td>
<td>**</td>
</tr>
<tr>
<td>Male</td>
<td>189 (21.0%)</td>
<td>150 (16.6%)</td>
</tr>
<tr>
<td>Female</td>
<td>270 (28.7%)</td>
<td>155 (16.5%)</td>
</tr>
</tbody>
</table>

*Note. Data from the Korea Youth Panel Study (KYPS, 2005-2009), (n = 1,843)*

As shown in Table 8, the prevalence of the non-offender group was greater among females (28.7%) than among males (21.0%), which was similar to the desister group
(25.3% of females, 16.1% of males). There was generally equal dispersion of males (16.6%) and females (16.5%) in the stable offender group. In the late-onsetter group, however, there was a substantially larger frequency of males (40.7%) than females (25.3%). Thus, while more females reported constant non-involvement in delinquent activity, those who did commit delinquent activity appeared to be more stable in their delinquent involvement than males. Furthermore, in this study, females had a greater tendency to be desisters, while males who were involved in delinquent acts had a greater tendency to be late-onsetters. This is consistent with previous findings that more females tend to be desisters compared with males and the prevalence of non-offenders is greater among females than among males (Chung, et al., 2002a).

Stage II: Three Latent Growth Models (LGMs)

The purpose of the second stage of the analysis is to conduct three latent growth models in order to assess the effects of low self-control and parental attachment for each trajectory on the type of delinquent behavior committed over time. As noted in Chapter III, this study used LGM for the following reasons. The LGM represents differences over time that takes into account the means of the dependent variable (which are accounted for within the intercept factor) as well as the rate of change in the dependent variable (slope factor) at individual and group levels (Schumacker & Lomax, 2004).

Furthermore, one of the advantages of LGM is that it can be employed to determine how the change in one variable affects the change in another variable over time (Duncan et al., 2010). As previously stated, gender, family monthly income, and maternal employment were included within all latent growth models as time-invariant variables while both low self-control and attachment to parents were included as time-variant variables.
Summary of LGM Analysis

Figure 7 provides a concept map of the analysis procedure for Stage II on each trajectory. Based on classification of offender from Stage I, the adolescents were divided into three submodels contingent on their group classification: (1) the stable offender group (Model I), (2) the late-onsetter group (Model II), and (3) the desister group (Model III). The LGM was estimated across all three groups separately to assess potential interactions among gender, family monthly income, and maternal employment in relation to changes within time-varying covariates (i.e., attachment to parents and low self-control) as well as changes in juvenile offending. The three submodels of the data were individually examined and then enhanced in three steps. These are discussed below.

Figure 7. Statistical analysis map of the study
Modeling Change (Steps in LGM)

Latent growth curve models are often analyzed in multiple steps as it allows for easier identification of potential sources of poor model fit (Kline, 2005). Therefore, as shown in Figure 8, each model in this study is advanced in three steps.

![Diagram of changes in levels of juvenile delinquency and low self-control]

Figure 8. Theoretical models of juvenile offending and the direct/indirect effects of parental attachment and low self-control as time-varying covariates. “D” refers to juvenile offending, “A” refers to attachment to parents and “S” refers to low self-control.

Step I

Each model was first constructed as a basic LGM, which measured the change in the dependent variable without the effects of any independent variables. This model of the dependent variable (i.e., the annual measurement of juvenile delinquency) was analyzed as an indicator of two latent growth factors, the intercept and slope factors (see
Figures 9, 13, and 16). The intercept factor represents the baseline level of juvenile offending, meaning the average reported level of delinquent involvement. The slope factor however represents the change in classification within the seriousness index for juvenile offending.

**Step II**

The second step was an iterative model developed from the process in step I. This model was expanded to include three time-invariant variables representing gender, family monthly income, and maternal employment to examine how risk factors contribute to the existing variability in juvenile offending over time.

**Step III**

The final step was to expand the step II model to include the two time-varying covariates (i.e., low self-control and attachment to parents). As shown in Figure 8, these covariates were included to estimate the direct and indirect effects on juvenile offending.

**Model Fit**

The proposed latent growth models were tested using AMOS 16.0 to calculate maximum likelihood estimations. As previously mentioned, each model advanced in three steps, thus each step was estimated using goodness-of-fit statistics to determine the best fitting model for the corresponding data. Each model tested traditional three model fit indices: (1) the chi-square statistic ($\chi^2$), (2) the comparative fit index (CFI), and (3) the root-mean-square error of approximation (RMSEA) with a 90% confidence interval (CI).

The chi-square statistic assesses significant value relative to the degrees of freedom and indicates that the observed and estimated matrices differ. The CFI, which was also used to assess model fit, is conducted by assessing the relative improvement in
fit of the new model (researcher’s model) compared with the baseline model (the null model) (Kline, 2005). CFI controls for chi-square’s sensitivity to sample size by accounting for the sample size of the model (Duncan, et al., 2010). RMSEA was also used to assess model fit as it allows for “the construction of confidence intervals, which provide more information than the hypothesis test because the interval estimate indicates the degree of precision of the sample value of the index” (MacCallum et al., 1996, p. 130). According to Kline (2005), a non-significant chi-square, accompanied by a CFI of no less than .95 and a RMSEA of no more than .05 (values falling below .08 are considered adequate) typically indicate a good fitting model.

Model I: The Stable Offender Group

The first model analyzed was derived from the stable offender trajectory. The stable offender group included adolescents who were consistently involved in juvenile delinquency throughout all five years. In other words, the participants had some level of consistent involvement in delinquency throughout the adolescent period, yet the frequency of involvement decreased in each subsequent wave. This group of adolescents comprised approximately 17% of the sample. The sample size for the stable offender group was 305 adolescents; however, this model included five repeated measures with the total number of observations being 1,525. Males (16.6%) and females (16.5%) were almost equally represented in the stable offender group while other groups (i.e., the LOG and the desister group) represented different proportions.

Step 1

In order to assess the change in juvenile delinquency within the stable offender group trajectory a basic LGM was conducted for the dependent variable, excluding all
other variables from the model. This basic model answered the question. “What is the stable offender group of adolescents’ mean starting point and mean increments in the seriousness levels of juvenile delinquency from age 15 through 19?” The stable offender group (Model I) was developed with five indicators for the two latent growth factors (i.e., the slope and the intercept), which represent a repeat measure of the juvenile delinquency seriousness index. This was conducted to assess the initial average starting point of these participants, as well as the change in the seriousness index over the five waves of data. In other words, the repeated measures have an expected value that consists of the model-implied mean of juvenile delinquency for each wave as well as the expected change in juvenile delinquency that corresponds to the linear rate of growth (change over the five-year period).

The intercept factor represents the initial starting point of juvenile offending; therefore, the factor loadings on the latent intercepts were fixed to 1. In other words, the intercept factor represents a constant for any given individual across time, hence the fixed values for factor loadings of 1 on the repeated measure of juvenile delinquency (Duncan, et al., 2006). The factor loadings for the five measurements of delinquent behaviors on the latent slope factor were fixed to 0, 1, 2, 3, and 4 to test a linear rate of growth or change in juvenile offending.

The model fit indices for the stable offender group LGM (Step I), demonstrate poor fit to the data, with related fit statistics of \( \chi^2 = 43.54, df = 10, p < .001, CFI = .817, \) and \( \text{RMSEA} = .106 (CI: .035 - .059) \) (see Figure 9). This demonstrates that the model had a significant chi-square, accompanied by a CFI of less than .90 and a RMSEA of more than .05.
The base model of change for stable offenders’ changes in the juvenile offending seriousness index is presented in Figure 9. Within this model, it can be observed that there are significant effects for both the intercept and slope factors for individual variability in negative trajectories in juvenile offending over the five years. The intercept factor (mean = 1.88, \( p < .001 \)) demonstrates that the stable offender group reported an initial mean score of delinquent behavior of 1.9 for age 15, meaning that the initial level of seriousness in juvenile delinquency was reported at an average of 1.9 for those participants who were classified as stable offenders. Furthermore, the mean of the slope factor was negative (mean = -.174, \( p < .001 \)), suggesting that on average the seriousness level of delinquency decreased at a rate of .17 levels per year in offending. Therefore, its value remained constant between the minor and moderate levels of involvement in delinquent activities throughout the five-year adolescent period.

![Figure 9](image)

*Figure 9.* A basic LGM of juvenile offending for the stable offender group (\( n = 305 \)). Standardized coefficients are presented. “D” refers to delinquent behavior. ICEPT = the intercept factor, SLOPE = the slope factor.

As shown in Figure 9, the intercept and slope factors are specified to covary (this is represented by the bi-directional arrow between intercept and slope factors). The
estimate of this covariance represents the degree to which the initial levels of juvenile
delinquency can predict rates of subsequent linear change in juvenile delinquency (Kline,
2005). The correlation between the intercepts and slope factors within the stable offender
group represents a significant negative correlation \((r = -0.75, p < .001)\); thus, participants
who reported higher initial levels of offending had a lower rate of change than
participants who reported lower initial levels of offending.

**Step II**

The second step of the analysis for the stable offender group trajectory was an
iterative expansion of the base (Step I) model. This model was expanded to include the
three time-invariant variables (i.e., gender, family monthly income, and maternal
employment). The purpose of expanding the base model was to examine the main effect(s)
of possible time-invariant factors that are associated with the stable offender group
developmental pattern of juvenile offending. The model fit indices for the expanded
model indicated that the model was still of poor fit, with \(\chi^2 = 47.61, df = 19, p < .001,\)
CFI = .843, and RMSEA = .074 (CI: .049 - .099) (see Figure 10). The model fit indices
did not significantly improve over the Step I model, suggesting that the addition of time-
invariant variables did not increase the fit of the model.

As shown in Figure 10, each time-invariant variable was specified to have direct
effects on both the intercept and slope factors. The results of this model suggest that the
stable offender group of adolescents’ variability in juvenile delinquency was only
significantly associated with only gender. Gender was a significant predictor of the
intercept factor (standardized \(\beta = .20; S.E. = 2.485; p = .013\)) but not of the slope factor.
This indicates that on average, males reported significantly higher initial involvement in
juvenile offending than females (.20 levels higher); however, there were no significant differences between males and females in changes of delinquency over time. Additionally, family monthly income and maternal employment did not have a significant effect on changes in developmental trajectories over time.

![Diagram of LGM of juvenile offending including time-invariant variables for the stable offender group (n = 305). Only significant standardized coefficients are presented, *p < .05, **p < .01, ***p < .001.]

Figure 10. LGM of juvenile offending including time-invariant variables for the stable offender group (n = 305). Only significant standardized coefficients are presented, *p < .05., **p < .01., ***p < .001.

Step III

The third step of the analysis for the stable group involved the expansion of the model by including the time-variant covariates (i.e., low self-control and parental attachment). As mentioned in Chapter III, it is possible to include time-varying predictors that are themselves repeated measures. These additional regression parameters not only examine the direct influence of parental attachment and low self-control on juvenile offending but allow for the analyst to assess the indirect effects between changes in individuals’ levels of low self-control, parental attachment, and juvenile offending among the stable offender group.
Confirmatory Factor Analysis (CFA)

Both attachment to parents and low self-control were assessed with six items, each measured on a 5-point Likert scale. Therefore, before applying the final LGM the analyst conducted a confirmatory factor analysis (CFA) to evaluate how well the six items of low self-control as used by Gottfredson and Hirschi (1990), and the six items of attachment to parents as measured by Hirschi (1969), fit Korean Youth Panel data⁴. CFA is an appropriate statistical method when the hypothesized unidimensional factor or the number of underlying factors can be specified as either previously observed or theoretically hypothesized (Kline, 2005).

A theoretically hypothesized longitudinal CFA model of the five repeated measures of both time-variant variables (six-item unidimensional factors within each wave) is illustrated in Figure 11. All items for each latent variable are repeated measures from each wave of data; therefore, all associated items are correlated with their repeated measures by the associated error terms (these are represented by the bi-directional arrows within Figure 11). Mirroring Martens and Martin’s (2010) study of longitudinal CFA models, it was hypothesized that there would be a significant relationship between each item’s repeated measures. The theoretically hypothesized longitudinal CFA model (see Figure 11) in this study is designed to test all time-variant variables (time-varying covariates). Thus, a CFA was conducted in each variable (i.e., attachment to parents and low self-control) in each model (i.e, Model I, II, and III).

---

⁴ *A General Theory of Crime* (Gottfredson & Hirschi, 1990) asserts that individuals with low self-control can be operationalized by measuring impulsivity, insensitivity, risk-taking, short-sightedness, physical activity, and temper. Attachment variables were measured based on relationships with respondents’ parents that included family interaction and supervision, support, care and trust, and communication (Hirschi, 1969).
Attachment to parents (A1-A5).

Three model fit indices were used to assess the goodness-of-fit: the chi-square statistic ($\chi^2$), CFI, and RMSEA with a 90% CI. The model fit indices indicated adequate fit to the data, $\chi^2 = 783.70$, $df = 335$, $p < .001$, CFI = .926, and RMSEA = .066 (CI: .060 - .072). Five repeated measures of attachment to parents suggested that the fit of the data to the hypothesized model is adequate. All five repeated measures of the standardized regression weights (factor loadings) on parental attachment from wave one to wave five were above .50 (ranged from .598 to .876; all $p < .01$) and were statistically significant for all six items for each wave. Factor loadings indicate the degree of correspondence between the variable and the factor (Hair et al., 2006). Higher loadings make the variable representative of the factor. A loadings score .30 is the minimal level to be included in the model (Hair, Black, Babin, Anderson, & Tatham, 2006).

Low self-control (S1-S5).

The model fit indices indicated adequate fit to the data as follow: $\chi^2 = 538.66$, $df = 335$, $p < .001$, CFI = .929, and RMSEA = .045 (CI: .038 - .052). All five repeated measures of the standardized regression weights (factor loadings) on low self-control scale from wave one to wave five were above .40 (ranged from .406 to .620; all $p < .01$) and was statistically significant for all six items for each wave.

These findings suggest that the time-variant latent variables (both attachment to parents and low self-control) were relatively consistent between five time points, along with consistent significant factor loadings of their six associated items. Thus, these two time-variant variables are found to be appropriate to include within the final iteration of the LGM of the stable offender group.
Figure 11. Hypothesized longitudinal CFA model at the subscale level with five repeated measurement of time-varying covariates. All items were correlated with matching items in each wave by associated error terms.

Analysis of the Final LGM of the Stable Offender Group

The final model included the time-variant variables (i.e., attachment to parents and low self-control). The model fit indices indicated adequate fit to the data, with $\chi^2 = 180.87$, $df = 109$, $p < .001$, $CFI = .950$, and $RMSEA = .047$ (CI: .075 - .139) (see Figure
It can be observed that this model has a significant chi-square\(^5\), a CFI of more than .90 and a RMSEA of less than .05. There was a significant improvement from the previous model. Therefore, fit indices for the stable offender group suggested that with each iteration of the model, the fit improved.

\[ \chi^2 (df) = 180.87 \ (109), \ p < .001 \]
\[ \text{CFI} = .950 \]
\[ \text{RMSEA} = .047 \]

*Figure 12.* The final model included two time-varying covariates for the stable offender group \((n = 305)\). Only significant standardized coefficients are presented. “D” refers to juvenile offending, “A” refers to attachment to parents and “S” refers to low self-control. *\(p < .05\), **\(p < .01\), ***\(p < .001\).*

The results of the final model of the stable offender group are presented in Table 9 and Figure 12, which numerically and graphically illustrate the parameter estimates of the time-invariant variables’ effects on the intercept and slope factors, as well as additional

---

\(^5\) Chi-square indicated a significant probability level. As noted above, the chi-square statistic assesses the “badness of fit” of the model, and is extremely sensitive to sample size. It controls for chi-square’s sensitivity to sample size by accounting for the sample of the model (Duncan et al., 2010), because as sample size increases (generally above 200), the chi-square test has a tendency to indicate a significant probability level and vice versa (Schumacker et al., 2004). The stable offense group’s sample size for this analysis is 305 adolescents; however, this model included five repeated measures with the total number of observations being 1,525. Thus, the stable offender group indicated a significant probability level.
regression parameters employed to estimate the direct and indirect effects on juvenile offending between time-variant variables.

Table 9

*Parameter Estimates from the Final LGM for the Stable Offender Group*

<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>β</th>
<th>SE</th>
<th>CR</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time-invariant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.254</td>
<td>.225</td>
<td>.089</td>
<td>2.871</td>
<td>.004</td>
</tr>
<tr>
<td>Slope</td>
<td>-.057</td>
<td>-.194</td>
<td>.027</td>
<td>-2.074</td>
<td>.038</td>
</tr>
<tr>
<td>Monthly income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.000</td>
<td>.014</td>
<td>.000</td>
<td>.181</td>
<td>.856</td>
</tr>
<tr>
<td>Slope</td>
<td>.000</td>
<td>.063</td>
<td>.000</td>
<td>.685</td>
<td>.493</td>
</tr>
<tr>
<td>Maternal employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-.094</td>
<td>-.083</td>
<td>.089</td>
<td>-1.057</td>
<td>.291</td>
</tr>
<tr>
<td>Slope</td>
<td>.004</td>
<td>.014</td>
<td>.028</td>
<td>.155</td>
<td>.877</td>
</tr>
<tr>
<td><strong>Time-variant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Self-control (S)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>-.045</td>
<td>-.191</td>
<td>.011</td>
<td>-4.068</td>
<td>.001</td>
</tr>
<tr>
<td>Time 2</td>
<td>-.045</td>
<td>-.197</td>
<td>.010</td>
<td>-4.619</td>
<td>.001</td>
</tr>
<tr>
<td>Time 3</td>
<td>-.025</td>
<td>-.125</td>
<td>.008</td>
<td>-3.092</td>
<td>.002</td>
</tr>
<tr>
<td>Time 4</td>
<td>-.043</td>
<td>-.217</td>
<td>.008</td>
<td>-5.417</td>
<td>.001</td>
</tr>
<tr>
<td>Time 5</td>
<td>-.033</td>
<td>-.195</td>
<td>.009</td>
<td>-3.878</td>
<td>.001</td>
</tr>
<tr>
<td>Attachment to parents (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>.054</td>
<td>.010</td>
<td>.009</td>
<td>1.106</td>
<td>.269</td>
</tr>
<tr>
<td>Time 2</td>
<td>-.012</td>
<td>-.002</td>
<td>.009</td>
<td>-.274</td>
<td>.784</td>
</tr>
<tr>
<td>Time 3</td>
<td>.061</td>
<td>.010</td>
<td>.007</td>
<td>1.387</td>
<td>.165</td>
</tr>
<tr>
<td>Time 4</td>
<td>-.016</td>
<td>-.002</td>
<td>.006</td>
<td>-.353</td>
<td>.724</td>
</tr>
<tr>
<td>Time 5</td>
<td>.037</td>
<td>.005</td>
<td>.006</td>
<td>.724</td>
<td>.469</td>
</tr>
</tbody>
</table>

A1 → S1 .075 .092 .039 1.939 .052
A2 → S2 .044 .053 .040 1.115 .265
A3 → S3 .048 .061 .036 1.344 .179
A4 → S4 .098 .131 .035 2.782 .057
A5 → S5 .027 .037 .035 .761 .447

*Note:* β, unstandardized; β, standardized.; “A” refers to attachment to parents; “S” refers to low self-control.

As shown in Table 9, family monthly income and maternal employment remained unrelated to both the intercept and slope factors continuously, even with the additional parameters. Conversely, gender remains a statistically significant predictor of the
intercept factor (standardized $\beta = .225$; S.E. = .089; $p = .004$), as well as the slope factor (standardized $\beta = -.194$; S.E. = .027; $p = .038$) (see Table 9).

In other words, the final model results show that on average, males reported significantly higher initial involvement in juvenile offending than females (.225 higher); however, they decreased more rapidly than females by .194 levels per year. For the time-varying covariates (see Table 9), all five repeated measures of low self-control (representing change in levels of self-control over the five time periods) had a significant negative association with changes in juvenile offending over time (standardized $\beta$’s ranged from -.125 to -.217 over the five time periods; all $p < .05$), meaning that as level of self-control increased, involvement in delinquent acts decreased.

The most significant finding in these estimates is a significant relationship between low self-control and juvenile delinquency, despite the fact development in low self-control covaries with development in juvenile delinquency over time. In other words, the results suggested that the change observed from each wave of juvenile delinquency (a consistent slight decline) was significantly associated with changes in low self-control (a consistent slight increase in the levels of self-control) across the five points in time. However, none of the five repeated measures of attachment to parents (representing change in parental attachment over the five time periods) were significantly related to juvenile offending within the stable offender group. Furthermore, when including low self-control as a mediating variable, the indirect relationship between parental attachment and juvenile delinquency remained nonsignificant.

To conclude, adolescents in the stable offender group had a mean of 1.884 of juvenile offending at age 16, and this score declined at a rate of .174 levels per year (from
ages 15 to 19). Moreover, even though the stable offenders had a consistent decrease in levels of delinquency this decreasing rate remained constant between minor and moderate levels of offending throughout all five waves. Lastly, only gender and low self-control had a significant effect on the change in growth on juvenile offending (slightly decreased in juvenile offending) among stable offender group of adolescents.

Model II: The Late-onsetter Group (LOG)

The second model analyzed was derived from the LOG trajectory. The LOG included adolescents who did not commit delinquent offending at age 15 (wave one), but became involved in delinquent behaviors from age 16 (wave two) through age 19 (wave five). In other words, the LOG of offenders reported no involvement in delinquent offenses at the first wave, however, subsequently reported minor level of offending. Approximately 32 % of all participants were identified within the LOG trajectory. The sample size for this analysis was 596 adolescents; however, this group model included four repeated measures with the total number of observations being 2,384. The prevalence of this group was greater among males ($n = 367$) than females ($n = 229$).

Step I

In order to assess the change in juvenile delinquency within the LOG trajectory, a basic LGM was conducted for the dependent variable, which excluded all other variables from the model. The LOG (Model II) was developed with four indicators for the two latent growth factors (i.e., the slope and the intercept), which represent a repeated measures of the juvenile delinquency seriousness index. Only waves two through five were employed for this LOG model. The first wave was excluded because there was no reported involvement in delinquent behavior in the first year of study, thus there was no
variability in delinquency. The model was constructed similarly to the stable offenders; factor loadings for the four repeated measures of delinquent behavior on the latent intercept factor were fixed to 1 and the factor loadings for the four measures of delinquent behaviors on the latent slope factor were fixed to 0, 1, 2 and 3 from wave 2, 3, 4 and 5.

The basic model of change in juvenile offending for the LOG is presented in Figure 13. The model indices for the LOG base model indicated poor fit to the data, \( \chi^2 = 93.58, df = 5, p < .001, \ CFI = .451, \) and \( \text{RMSEA} = .173 (CI: .143 - .204) \) (see Figure 13). This group indicated a significant chi-square, accompanied by a CFI of less than .90 and a RMSEA of more than .05.

![Figure 13. A basic LGM of juvenile offending for the LOG (n = 596). Standardized coefficients are presented.](image)

As shown in Figure 13, the model demonstrates that there are significant effects for both the intercept and slope factors for individual variability in positive trajectories for juvenile offending over the four years. The intercept factor (mean = .242, \( p < .001 \)) reflected that the LOG reported an average starting point of delinquent involvement
of .242 at age 16. Furthermore, the mean of the slope factor was positive (mean = .274, \( p < .001 \)) demonstrating that late-onsetters have an average increase of .274 levels per year in juvenile offending. In other words, the LOG of adolescents was not involved in any delinquent offending at age 15 (wave one), but by age 16 had a mean involvement of .242, which consistently increased .274 levels annually thereafter. Within the LOG as shown in Figure 13, the bi-directional arrow between the intercepts and slope factors within the LOG represented a significant negative correlation (\( r = -.77, p < .001 \)), meaning that adolescents who initially reported higher involvement in delinquency at the second wave changed at a lower rate annually than those who initially reported lower levels of involvement in delinquent acts.

\textit{Step II}

The second step of the analysis for the LOG trajectory was an iterative expansion of the base model (Step I). As shown in Figure 14, this model was expanded to include the three time-invariant variables (i.e., gender, family monthly income, and maternal employment). These variables were then examined to assess the main effects of the time-invariant variables on changes in juvenile offending over time. The model fit indices for the expanded model indicated that the model was still of poor fit, \( \chi^2 = 98.48, df = 11, p < .001 \), CFI = .466, and RMSEA = .116 (CI: .095 - .137) (see Figure 14). The model fit indices did not significantly improve, suggesting that addition of time-invariant variables did not increase the fit of the model. As shown in Figure 14, there were no significant time-invariant variables for both the intercept and slope factors within the LOG of adolescents’ variability. Thus, the demographic characteristics included in the model did not provide any significant explanation of changes in juvenile delinquency over time.
Step III

The third step of the analysis for the LOG involved the expansion of the model by including the time-variant covariates (i.e., low self-control and attachment to parents). As mentioned in Chapter III, it is possible to include time-varying predictors that are themselves repeated measures. These additional regression parameters not only examine the direct influence of parental attachment and low self-control on juvenile offending but allow for the analyst to assess the indirect effects between changes in individuals’ levels of self-control, parental attachment, and juvenile offending among the LOG.

Confirmatory Factor Analysis (CFA)

Both attachment to parents and low self-control were assessed with six items, each measured on a 5-point Likert scale. Therefore, before applying final LGM, the analyst conducted a confirmatory factor analysis (CFA) to evaluate how well the six items of self-control developed by Gottfredson and Hirschi (1990) and the six items of
Attachment to parents developed by Hirschi (1969) fit within the Korean Youth Panel data. Within the LOG, the same longitudinal CFA model in the stable offense group was used to evaluate the unidimensionality of both factors’ corresponding items (see Figure 11 in Model I). Therefore, a theoretically hypothesized longitudinal CFA model of the four repeated measures (excluding wave one) of both time-variant variables (six-item unidimensional factors within each wave) is employed. All items for each latent variable are repeated measures from each wave of data; therefore, all associated items were correlated with their repeated measures by the associated error terms.

**Attachment to parents (A1-A5).**

The determination of acceptable longitudinal CFA model was based on three goodness-of-fit criteria, the chi-square statistic ($\chi^2$), CFI, and RMSEA with a 90% CI. For attachment to parents, the model fit indices indicated adequate fit to the data, $\chi^2 = 797.53$, $df = 210$, $p < .001$, CFI = .932, and RMSEA = .069 (CI: .064 - .074). All four repeated measures of the standardized regression weights (factor loadings) on parental attachment scale were above .60 (ranged from .663 to .853; all $p < .01$) which was statistically significant for all six items for each wave.

**Low self-control (S1-S5).**

The model fit indices indicated adequate fit to the data as follows: $\chi^2 = 461.50$, $df = 210$, $p < .001$, CFI = .936, and RMSEA = .045 (CI: .038 - .050). All four repeated measures of the standardized regression weights (factor loadings) on parental attachment scale were above .40 (ranged from .411 to .618; all $p < .01$) which was statistically significant for all six items for each wave. These findings suggest that these time-variant latent variables (both attachment to parents and low self-control) as unidimensional
factors were relatively consistent between four time points. Thus, these two time-variant variables are presumed to be appropriate variables for inclusion in the final iteration of LGM within the LOG.

**Analysis of the Final LGM of the LOG**

The model fit indices for the final model demonstrated that it was of good fit to the data, $\chi^2 = 128.78, df = 69, p < .001$, CFI = .963, and RMSEA = .038 (CI: .028 - .048) (see Figure 15). By examining the Step III model fit indices, it can be observed that there was a significant improvement from the previous model. To explain further, the fit indices for the late-onsetter model demonstrated continuous improvement of model fit at each subsequent iteration.

![Graph](image)

Figure 15. The final model included two time-varying covariates for the LOG ($n = 596$). Only significant standardized coefficients are presented. *$p < .05$, **$p < .01$, ***$p < .001$.

The results of the final model of the LOG are presented in Table 10 and Figure 15, which provide numerical and graphical illustration of the parameter estimates of the time-
invariant covariates’ effects on the intercept and slope factors, as well as additional regression parameters employed to estimate the direct and indirect effects on juvenile offending between time-variant variables.

As shown in Table 10, all time-invariant variables (i.e., gender, maternal employment, and family monthly income) remained unrelated to both the intercept and slope factors, even with the inclusion of the time-variant variables. Thus, there were no significant effects of gender, maternal employment or family monthly income on changes in delinquency over time. When analyzing the time-varying covariates, as shown in Table 10, it can be determined that all four repeated measures of low self-control were significantly and negatively related to changes in delinquent involvement over time (standardized β’s ranged from -.144 to -.155 over the four time periods, all p < .05). In other words, the results suggested each wave of juvenile delinquency (a consistent slight increase in the level of delinquent involvement) was significantly associated with changes in low self-control (a slight decrease in the levels of self-control) across the four points in time.

All measures of attachment to parents were nonsignificant predictors of juvenile offending with the exception of the third wave (standardized β = -.018, p = .03). Furthermore, there were no significant relationships between parental attachment and low self-control, meaning that when low self-control was included as a mediating variable between parental attachment and juvenile offending, there was still no significant relationship.
In summary, the LOG of adolescents had no reported involvement with any juvenile offending at age 15. After age 15, on average, adolescents had a mean of .242 of juvenile offending at age 16, and this score increased at a rate of .274 levels per year (from ages 16 to 19) (see Figure 13 in Step I). Only low self-control had a constant significant effect on changes in juvenile offending. Furthermore, there was no indirect effect on juvenile offending via low self-control over the four-year period for the LOG.
Model III: The Desister Group

The last model analyzed was derived from the desister trajectory. The desister group included adolescents who reported committing delinquent offending at age 15 (wave one) but then desisted between age 16 (wave two) and age 19 (wave five). In other words, the pattern of this trajectory demonstrated initial moderate involvement in delinquent activity, which then sharply decreased in waves two through four. All reported criminal involvement in the group had ceased by wave five. Adolescents who followed this trajectory comprised approximately 21% of the sample. The final sample size for this analysis was 383 adolescents; however, this group model included four-repeated measures with the total number of observations being 1,532. Furthermore, the prevalence of females ($n = 238$) in this group was greater than among males ($n = 145$).

Step I

In order to assess the change in the reported juvenile delinquency within the desister group trajectory, a basic latent growth model was conducted for the dependent variable, excluding all other independent variables from the model. The desister group (Model III) was developed with four indicators for the two latent growth factors (i.e., the slope and the intercept), which represent a repeat measure of juvenile delinquency seriousness index. Only waves one through four were employed for this desister model. The last wave was excluded because there was no reported involvement in delinquent behavior in the last year; thus, there was no variability in delinquency. Mirroring the other trajectories’ models, factor loadings for the four repeated measures of delinquent behavior on the latent intercept factor were fixed to 1 and the factor loadings for the four measures of delinquent behaviors on the latent slope factor were fixed to 0, 1, 2, and 3.
from wave 1, 2, 3 and 4. The model fit indices indicated poor fit for the base model (Step I), $\chi^2 = 11.56$, $df = 3$, $p = .001$, CFI = .754, and RMSEA = .086 (CI: .038 -.142) (see Figure 16). The base model had a significant chi-square, accompanied by a CFI of less than .90 and a RMSEA of more than .05.

As shown in Figure, 16, there are significant effects for both the intercept and slope factors for individual variability in negative trajectories in juvenile offending over the four years that can be observed within the base model. The intercept factor (mean = 1.413, $p < .001$) indicates that those in the desister group reported an initial involvement in juvenile offending of 1.413 at first wave. Furthermore, the significant mean of the slope factor was negative (mean = -.419, $p < .001$) suggesting that the mean involvement in juvenile offending had an average decline of .419 levels per year. The desister group of adolescents was not involved in any delinquent offending at wave five; therefore the initial starting point of the delinquent involvement is 1.413 at age 15 and decreased .419 levels per year until the age of 19, where delinquent involvement was equal to 0.

*Figure 16.* A basic LGM of juvenile offending for the desister group ($n = 383$). Standardized coefficients are presented.
As shown in Figure 16, the intercept and slope factors are specified to covary (i.e., the bi-directional arrow between intercept and slope factors). The correlation between the intercepts and slope factors within the stable offender group represent a significant negative correlation \( r = -.64, p < .001 \); meaning that adolescents who reported higher initial involvement in offending (at wave one) desisted from crime at a slower rate than those who initially reported lower levels of delinquent involvement.

**Step II**

The base model was then expanded in the second iteration to include the three time-invariant variables (i.e., monthly income, gender, and maternal employment) to examine their effects on changes in delinquent involvement over time. The model fit indices for the second iteration of the model demonstrated poor fit, \( \chi^2 = 22.37, df = 9, p = .001 \), CFI = .668, and RMSEA = .062 (CI: .030 - .095) (see Figure 17). The model fit indices did not significantly improve from Step I, suggesting that addition of time-invariant variables did not increase the fit of the model.

As shown in Figure 17, each time-invariant variable was specified to have direct effects on both the intercept and slope factors. This model suggests that the desister group of adolescents’ variability in juvenile delinquency was significantly associated with gender only. Gender was a significant predictor of the intercept factor (standardize \( \beta = .37; \) S.E. = .068; \( p = .007 \)), as well as the slope factor (standardize \( \beta = -.30; \) S.E. = .029; \( p = .013 \)). This demonstrates that males reported higher levels of delinquency than females by .37; however, they also had a higher rate of decline than females, by .30 levels annually. All other variables were found to be nonsignificant predictors for either the intercept or slope factors.
Figure 17. LGM of juvenile offending including time-invariant variables for the desister group \((n = 383)\). Only significant standardized coefficients are presented. \(*p < .05\), \(**p < .01\), \(***p < .001\).

**Step III**

The third step of the analysis for desisters involved the expansion of the model by including the time-variant covariates (i.e., low self-control and parental attachment). As mentioned in Chapter III, it is possible to include time-varying predictors that are themselves repeated measures. These additional regression parameters not only examine the direct influence of parental attachment and low self-control on juvenile offending but allow the analyst to assess the indirect effects between changes in individuals’ levels of self-control, parental attachment, and juvenile offending among the desister group.

**Confirmatory Factor Analysis (CFA)**

Both attachment to parents and low self-control were assessed using six items, each measured on a 5-point Likert scale. Therefore, before applying the final LGM, the analyst conducted a confirmatory factor analysis (CFA) to evaluate how well the six items of low self-control by Gottfredson and Hirschi (1990) and the six items of
attachment to parents by Hirschi (1969), fit within the Korean Youth Panel data. Within the desister group, the same longitudinal CFA model in the stable offense group was used to evaluate the unidimensionality of both factors’ corresponding items (see Figure 11 in Model I).

Therefore, a theoretically hypothesized longitudinal CFA model of the four repeated measures (excluding wave five) of both time-variant variables (six-item unidimensional factors within each wave) is employed. All items for each latent variable were repeated measures from each wave of data (with the exception of wave five); therefore, all associated items were correlated with their repeated measures by the associated error terms.

*Attachment to parents (A1-A5).*

To determine whether the model was exhibited acceptable fit, three goodness-of-fit criteria were examined, including the chi-square statistic ($\chi^2$), CFI, and RMSEA with a 90% CI. For attachment to parents, the model fit indices indicated adequate fit to the data, $\chi^2 = 658.43$, $df = 210$, $p < .001$, CFI = .920, and RMSEA = .075 (CI: .068 - .081). All four repeated measures of the standardized regression weights (factor loadings) on parental attachment scale were above .60 (ranged from .630 to .847; all $p < .01$) which was statistically significant for all six items for each wave.

*Low self-control (S1-S5).*

The model fit indices indicated adequate fit to the data, $\chi^2 = 455.57$, $df = 210$, $p < .001$, CFI = .905, and RMSEA = .055 (CI: .048 - .062). All four repeated measures of the standardized regression weights (factor loadings) on parental attachment scale were above .40 (ranged from .431 to .645; all $p < .01$) which was statistically significant for all
six items for each wave. In summary, these findings suggest that these time-variant latent variables (both attachment to parents and low self-control) as unidimensional factors were relatively consistent between four time points. Thus, these two time-variant variables are appropriate to use in the final step of LGM for the desister group.

**Analysis of the Final LGM of the Desister Group**

For model fit the final model included time-variant variables (i.e., parental attachment and low self-control). The model fit indices indicated good fit to the data $\chi^2 = 78.51, df = 69, p = .203$, CFI = .989, and RMSEA = .019 (CI: .000 - .037) (see Figure 18). By examining the Step III model fit indices, it can be observed that there was an improvement from the previous model.

To expand, it was concluded that the model fit improved at each iteration, with the final model demonstrating the best fit to the data. The results of the final model of the
desister group are presented in Table 11 and Figure 18, which numerically and graphically illustrate the parameter estimates of the time-invariant variables’ effects on the intercept and slope factors, as well as the additional regression parameters employed to estimate the direct and indirect effects on juvenile offending between time-variant variables.

As shown in Table 11, family monthly income and maternal employment remained unrelated to both the intercept and slope factors, even with the additional parameters. Gender was still the only variable that had a significant effect on changes in juvenile offending on both the intercept (standardized $\beta = .358$; S.E. = .066; $p = .007$) and slope factor (standardized $\beta = -.292$; S.E. = .028; $p = .012$), even with the additional parameters included in the final model. In other words, the final model demonstrated that on average, males reported significantly higher initial involvement in juvenile offending than females (.358 higher); however, they decreased more rapidly than females by .292 levels per year. For the time-varying covariates, as shown in Table 11, all four repeated measures of low self-control were significantly and negatively related with changes in juvenile offending over time (standardized $\beta$’s ranged from -.112 to -.193 over the four time periods, all $p < .05$). This suggests that changes in the levels of self-control are negatively associated with juvenile offending over time (decrease in the developmental trajectory). In other words, higher levels of self-control diminished the likelihood of involvement in delinquent acts among the desister group. This result suggests that each measurement of juvenile offending (a consistent decrease in seriousness scale) is significantly associated with changes in low self-control (a slight increase in the levels of self-control) four points in time.
Table 11

Parameter Estimates from the Final LGM for the Desister Group

<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>β</th>
<th>SE</th>
<th>CR</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time-invariant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.180</td>
<td>.358</td>
<td>.066</td>
<td>2.716</td>
<td>.007</td>
</tr>
<tr>
<td>Slope</td>
<td>-.071</td>
<td>-.292</td>
<td>.028</td>
<td>-2.511</td>
<td>.012</td>
</tr>
<tr>
<td>Monthly income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.000</td>
<td>-.109</td>
<td>.000</td>
<td>-.820</td>
<td>.412</td>
</tr>
<tr>
<td>Slope</td>
<td>.000</td>
<td>.067</td>
<td>.000</td>
<td>1.505</td>
<td>.132</td>
</tr>
<tr>
<td>Maternal employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.097</td>
<td>.200</td>
<td>.065</td>
<td>1.505</td>
<td>.132</td>
</tr>
<tr>
<td>Slope</td>
<td>-.038</td>
<td>-.162</td>
<td>.028</td>
<td>-1.380</td>
<td>.168</td>
</tr>
<tr>
<td>Time-variant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Self-control (S)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>-.038</td>
<td>-.188</td>
<td>.010</td>
<td>-3.758</td>
<td>.001</td>
</tr>
<tr>
<td>Time 2</td>
<td>-.044</td>
<td>-.193</td>
<td>.011</td>
<td>-3.882</td>
<td>.001</td>
</tr>
<tr>
<td>Time 3</td>
<td>-.019</td>
<td>-.134</td>
<td>.007</td>
<td>-2.719</td>
<td>.007</td>
</tr>
<tr>
<td>Time 4</td>
<td>-.013</td>
<td>-.112</td>
<td>.006</td>
<td>-2.247</td>
<td>.025</td>
</tr>
<tr>
<td>Attachment to parents (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>.002</td>
<td>.014</td>
<td>.008</td>
<td>.274</td>
<td>.784</td>
</tr>
<tr>
<td>Time 2</td>
<td>-.010</td>
<td>-.052</td>
<td>.010</td>
<td>-1.050</td>
<td>.294</td>
</tr>
<tr>
<td>Time 3</td>
<td>-.011</td>
<td>-.086</td>
<td>.006</td>
<td>-1.732</td>
<td>.083</td>
</tr>
<tr>
<td>Time 4</td>
<td>-.007</td>
<td>-.071</td>
<td>.005</td>
<td>-1.418</td>
<td>.156</td>
</tr>
<tr>
<td>A1 → S1</td>
<td>.094</td>
<td>.113</td>
<td>.037</td>
<td>2.551</td>
<td>.011</td>
</tr>
<tr>
<td>A2 → S2</td>
<td>.059</td>
<td>.069</td>
<td>.037</td>
<td>1.605</td>
<td>.108</td>
</tr>
<tr>
<td>A3 → S3</td>
<td>.091</td>
<td>.097</td>
<td>.042</td>
<td>2.170</td>
<td>.030</td>
</tr>
<tr>
<td>A4 → S4</td>
<td>.112</td>
<td>.122</td>
<td>.042</td>
<td>2.675</td>
<td>.007</td>
</tr>
</tbody>
</table>

Note. β, unstandardized; β, standardized.

Parental attachment was not a significant predictor of juvenile offending for any waves of data. However, parental attachment did have a significant effect on low self-control (standardized β’s ranged from .097 to .122 over the four time periods, all \(p < .05\)) with the exception of wave two (standardized β = .069, \(p = .108\)). The results indicated that the effect of parental attachment on juvenile offending among the desister group is only indirect when mediated by low self-control. In other words, parental attachment was
positively associated with low self-control, which in turn was negatively associated with juvenile offending, indicating that adolescents within the desister group who had experienced strong parental attachment had higher levels of self-control that then indicated decreased likelihood of involved in juvenile offending.

In summary, on average the adolescents identified as following a desistance pattern had reported their initial starting point of juvenile offending at 1.413 at age 15, and this score continuously decreased at a mean rate of .419 levels annually and completely desisted at age 19 (see Figure 16 in Step I). Gender and low self-control demonstrated significant effects on juvenile offending over time. Moreover, attachment to parents indirectly affected juvenile offending through low self-control over the four-year period.

Second Goal of the Study

The second goal of this study is to examine Gottfredson and Hirschi’s (1990) second proposition of self-control theory (stability of self-control) throughout the life-course. Specifically, Gottfredson and Hirschi (1990) purported that absolute levels of self-control (levels within the individual) may have a slight increase through the life-course; however, relative levels of self-control (the differences between individuals) would remain constant throughout the life-course. To expand, if two individuals at age 12 had levels of self-control that could be quantified at 8 and 10 (which would mean a difference of two), those may increase slightly throughout the life-course (i.e., to 10 and 12); however, the difference (between) would remain constant (2).

Based on the best-fitting classification models that were estimated in Stage I, the stability of self-control was examined for each of the four groups (i.e., non-offenders,
stable offenders, late-onsetters, and desisters) separately. In order to test the stability of self-control, correlation coefficients were calculated.

Absolute Stability (within-individual)

Absolute stability of self-control is tested by retrieving multiple measures of individuals’ levels of self-control throughout their lifetimes. These levels of self-control are theorized to be stable over time (Hay & Forrest, 2006). In other words, throughout an individual’s life-course, his or her level of self-control at one age should mirror all other ages (Hay & Forrest, 2006). According to previous studies, correlation coefficients are the most common way to assess both absolute and relative stability of self-control (e.g., Arneklev, et al., 1998; Beaver, et al., 2008; Burt, et al., 2006; Mitchell & Mackenzie, 2006; Raffaelli, et al., 2005; Turner & Piquero, 2002; Winfree, et al., 2006). Therefore, this study assessed absolute stability of self-control by examining correlation coefficients between self-control scores measured at five points in time. In other words, correlation coefficients were used to examine whether levels of self-control remained absolutely stable during adolescence. Furthermore, Figures 16 through 19 graphically illustrate the trajectories of juveniles’ mean seriousness levels of offending, as well as their mean levels of self-control over the five waves.

The Non-offender Group

The non-offender group included adolescents who were consistently not involved in juvenile delinquency through all five waves. In other words, the adolescents had zero level of consistent reported involvement in delinquency throughout the adolescent. This group of adolescents comprised approximately 25% of the sample. Figure 19 illustrates the mean levels of reported juvenile offending and self-control for the five time points. As shown, mean levels of seriousness in juvenile offending was zero (non-offense) over time
and mean levels of self-control remain constant. For example, mean levels at age 15 were 21.86 (SD = 3.65); as well as age 16 (mean = 21.71, SD = 3.85); age 17 (mean = 21.80, SD = 3.68); age 18 (mean = 21.75, SD = 3.65); and age 19 (mean = 21.86, SD = 3.73) (see Table 12).

Table 12 provides the results for the Pearson correlation coefficients between each reported mean level of self-control for all five waves for non-offenders. For example, self-control at age 15 had a correlation of .482 with self-control at age 16, which was similar correlation from age 16 to age 17 (r = .459, p < .05), from age 17 to age 18 (r = .558, p < .05), and from age 18 to age 19 (r = .511, p < .05).

All the correlations between each time points are significant and they demonstrate to be below .600. Between each wave over the five-year period the results indicated that absolute levels of self-control were moderately stable over time during the short-term (between adjacent waves), but less so over the long-term (between wave one and wave five) (r = .400, p < .05). However, according to Costa and McCrae’s (1994) standards, these results suggest that the non-offender group of individuals’ absolute levels of self-

Figure 19. The non-offender group: estimated mean levels of self-control and levels of seriousness of offending by age.
control were unstable\(^6\). Overall, approximately 25% of the total sample who were categorized in the non-offender group of adolescents experienced change over time.

Table 12

*Correlation Coefficients and Descriptive Statistics between Each Reported Mean Levels of Self-control for All Five Waves (Non-offenders)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave 2</td>
<td>.482**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 3</td>
<td>.488**</td>
<td>.495**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 4</td>
<td>.461**</td>
<td>.440**</td>
<td>.558**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 5</td>
<td>.400**</td>
<td>.424**</td>
<td>.555**</td>
<td>.511**</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>3.65</td>
<td>3.85</td>
<td>3.68</td>
<td>3.65</td>
<td>3.73</td>
</tr>
<tr>
<td>Change</td>
<td>-.14</td>
<td>.09</td>
<td>-.05</td>
<td>.11</td>
<td></td>
</tr>
</tbody>
</table>

Note: *\(p < .05\). **\(p < .01\). ***\(p < .001\). (\(n = 459\))

*The Stable Offender Group*

The stable offender group included adolescents who were consistently involved in juvenile delinquency through all five waves. This group of adolescents comprised approximately 17% of the sample. Figure 20 illustrates that juvenile offending decreased slightly while self-control decreased slightly at age 17 and slightly increased thereafter. As shown in Table 13, the absolute mean levels of self-control linearly increased slightly over time. However; it can be observed in Figure 19 that levels of self-control remained relatively constant and not deviating by more than .32. For example, mean levels of self-control at age 15 were 18.10 (SD = 3.85); as well as age 16 (mean = 18.07, SD = 3.93);

\(^6\) Typically stability coefficients that are equal to or higher than .60 are considered to represent a high degree of stability (Costa & McCrae, 1994).
age 17 (mean = 18.00, SD = 3.57); age 18 (mean = 18.17, SD = 3.57); and age 19 (mean = 18.32, SD = 3.55) (see Table 13).

Figure 20. The stable offender group: estimated mean levels of self-control and levels of seriousness of offending by age.

Table 13 provides the results for the relationship between each reported mean level of self-control for all five waves of data. The results indicate that all correlation coefficients between each time point are significant. More specifically, self-control at age 15 had a correlation of .575 with self-control at age 16 which can be interpreted as a general measure of absolute stability from age 16 to age 17 ($r = .533, p < .05$), from age 17 to age 18 ($r = .524, p < .05$), from age 18 to age 19 ($r = .570, p < .05$).

However, according to Costa and McCrae’s (1998) standards, any correlation coefficients below .600 are classified as unstable, and thus contradict Gottfredson and Hirschi’s (1990) proposition of absolute stability. The correlation coefficients corresponding to the relationship/s between each wave over the five-year period indicate that absolute levels of self-control were moderately stable over time during the short-term (between adjacent waves), but less so over the long-term (between wave one and wave five) ($r = .367, p < .05$). Overall, among South Korean youth panel data, approximately 16% of the total sample who was categorized in the stable offender group of adolescents experienced change over time that represent absolute unstable over the five years.
Table 13

Correlation Coefficients and Descriptive Statistics between Each Reported Mean Levels of Self-control for All Five Waves (Stable offenders)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave 2</td>
<td>.575**</td>
<td>.533**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 3</td>
<td>.504**</td>
<td>.533**</td>
<td>.524**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 4</td>
<td>.355**</td>
<td>.370**</td>
<td>.524**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 5</td>
<td>.367**</td>
<td>.335**</td>
<td>.464**</td>
<td>.570**</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>18.10</td>
<td>18.07</td>
<td>18.00</td>
<td>18.17</td>
<td>18.32</td>
</tr>
<tr>
<td>SD</td>
<td>3.85</td>
<td>3.93</td>
<td>3.57</td>
<td>3.57</td>
<td>3.55</td>
</tr>
<tr>
<td>Change</td>
<td>-.03</td>
<td>-.07</td>
<td>.17</td>
<td>.15</td>
<td></td>
</tr>
</tbody>
</table>

Note. *p < .05. **p < .01. ***p < .001. (n = 305)

The Late-onsetter Group (LOG)

The LOG of offenders reported no involvement in delinquent offenses at the first wave; however, after that age, they increased steadily up to minor level of seriousness offending. Figure 21 graphically illustrates the observed inverse relationship between reported juvenile offending and self-control. While offending increased steadily, levels of self-control appeared to decrease as age increased, demonstrating that levels of self-control were linearly decreasing as offending was increasing. For example, mean levels of self-control at age 15 were 20.62 (SD = 3.73); as well as age 16 (mean = 20.21, SD = 3.84); age 17 (mean = 20.27, SD = 3.87); age 18 (mean = 20.26, SD = 3.62); and age 19 (mean = 19.89, SD = 3.78) (see Table 14).
**Figure 21.** The LOG: estimated mean levels of self-control and levels of seriousness of offending by age.

Table 14 provides the results for the relationship between each reported mean level of self-control for all five waves of data for the LOG. For example, self-control at age 15 had a correlation of .459 with self-control at age 16, which was similar from age 16 to age 17 ($r = .445, p < .05$), from age 17 to age 18 ($r = .485, p < .05$), and from age 18 to age 19 ($r = .474, p < .05$).

Table 14

*Correlation Coefficients and Descriptive Statistics between Each Reported Mean Levels of Self-control for All Five Waves (Late-onsetters)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave 2</td>
<td>.459**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 3</td>
<td>.414**</td>
<td>.445**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 4</td>
<td>.373**</td>
<td>.357**</td>
<td>.485**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 5</td>
<td>.365**</td>
<td>.354**</td>
<td>.443**</td>
<td>.474**</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.62</td>
<td>20.21</td>
<td>20.27</td>
<td>20.26</td>
<td>19.89</td>
</tr>
<tr>
<td>SD</td>
<td>3.73</td>
<td>3.84</td>
<td>3.87</td>
<td>3.62</td>
<td>3.78</td>
</tr>
<tr>
<td>Change</td>
<td>-.41</td>
<td>.07</td>
<td>-.01</td>
<td>-.37</td>
<td></td>
</tr>
</tbody>
</table>

Note. ** = correlation coefficient is significant at the $p < .001$ level. ($n = 596$)
All the correlations between each time points are significant; however, all Pearson’s correlations coefficients were below .600 demonstrating that absolute levels of self-control were unstable. However, between each wave over the five-year period the results indicate that absolute levels of self-control were moderately stable over time during the short-term (between adjacent waves), but less so over the long-term (between wave one and wave five) \((r = .365, p < .05)\).

*The Desister Group*

The desister group pattern revealed moderate offending (Level 2) initially, but that trajectory sharply decreases from wave two and continued to decrease to the point of noninvolvement. However, this group of adolescents no longer committed any levels of offenses at age 19. This group of adolescents comprised approximately 21 % of the sample. Similar to the LOG, juvenile offending and self-control were inversely related. However, unlike the LOG levels of self-control increased, while levels of seriousness of juvenile offending decreased (see Figure 22). For example, mean levels of self-control at age 15 were 19.45 \((SD = 3.83)\), as well as age 16 \((mean = 19.73, SD = 3.70)\); age 17 \((mean = 20.16, SD = 3.94)\); age 18 \((mean = 20.43, SD = 3.97)\); and age 19 \((mean = 20.48, SD = 3.87)\) (see Table 15).

*Figure 22*. The desister group: estimated mean levels of self-control and levels of seriousness of offending by age.
Table 15 provides the results for the correlations between each reported mean level of self-control for all five waves for the desister group. For example, all the correlations between each time points are significant. Self-control at age 15 had a correlation of .500 with self-control at age 16, which was similar from age 16 to age 17 ($r = .427, p < .05$), from age 17 to age 18 ($r = .435, p < .05$), and from age 18 to age 19 ($r = .493, p < .05$). However, all Pearson’s correlation coefficients were reported at less than .600, demonstrating unstable absolute levels of self-control. Conversely, between each wave over the five-year period the results indicated that absolute levels of self-control were moderately stable over time during the short-term (between adjacent waves), but less so over the long-term (between wave one and wave five) ($r = .400, p < .05$).

Table 15

*Correlation Coefficients and Descriptive Statistics between Each Reported Mean Levels of Self-control for All Five Waves (Desisters)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave 2</td>
<td>.500**.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 3</td>
<td>.367**</td>
<td>.427**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 4</td>
<td>.327**</td>
<td>.389**</td>
<td>.435**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wave 5</td>
<td>.400**</td>
<td>.461**</td>
<td>.426**</td>
<td>.493**</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>19.45</td>
<td>19.73</td>
<td>20.16</td>
<td>20.43</td>
<td>20.48</td>
</tr>
<tr>
<td>SD</td>
<td>3.83</td>
<td>3.70</td>
<td>3.94</td>
<td>3.3497</td>
<td>3.87</td>
</tr>
<tr>
<td>Change</td>
<td>.28</td>
<td>.43</td>
<td>.27</td>
<td>.05</td>
<td></td>
</tr>
</tbody>
</table>

Note. *p < .05. **p < .01. ***p < .001. (n = 383)
In summary, according to Costa and McCrae’s (1994) standards, all four distinctive trajectory groups (i.e., non-offenders, stable offenders, late-onsetters, and desisters) revealed that the correlations between self-control measured at each time-point was below .60, which represented change over time in the absolute levels of self-control. In other words, South Korean adolescents experienced significant change over time in their levels of self-control. Even though all groups of adolescents had correlation coefficients reported at lower than .60, the non-offender and stable offender group revealed more stability in observed mean self-control (correlation coefficient ranged from .48 to .58, all \( p < .05 \)) than the late-onset and desister group (correlation coefficient ranged from .43 to .50, all \( p < .05 \)). In addition, only the late-onsetter group of adolescents’ (approximately 32% of the sample) levels of self-control appears to decrease as age increased, while the other groups of adolescents increased.

**Relative Stability (between-individual)**

Relative stability focuses on the differences between individuals. Regarding relative stability of self-control, Gottfredson and Hirschi (1990) stated that while absolute (within-individual) levels of self-control may increase over time, relative (between-individual) levels of self-control should remain constant. In order to test this relative stability proposition, previous studies used rank-order correlations because it allows detecting the differences between individuals. However, this technique is only appropriate to test relative stability when examining aggregate mean levels of self-control as a single developmental trajectory that applies to all individuals.

---

7 In the study of stability of self-control, usually researchers create four quartiles of self-control groups in order to employ rank-order correlation (e.g., Burt et al., 2006; Mitchell & Mackenzie, 2006; Turner & Piquero, 2002; Winfree et al., 2006). This rank-order correlation was designed to detect whether the individuals experienced a change in their original self-control ranking that moved them from one quartile to another.
Recently, the analysis of individual differences in developmental juvenile offending trajectory patterns has undergone more empirical testing because it assists in understanding individual differences of offending patterns. In the same sense, the presence of individual differences may represent that while one’s level of self-control is stable for some individuals, it is not for others. Based on the existence of different trajectory patterns rather than a single developmental trajectory of self-control, Gottfredson and Hirschi’s (1990) relative stability thesis can be hypothesized that there are no differently shaped trajectories because between-individual rankings on self-control should remain constant over time. In other words, each individual will follow a pattern roughly parallel and similar to that of all others. Furthermore, the application of classifications of developmental trajectories of self-control not only can examine the individual levels of absolute stability but also the between levels of relative stability (Hay & Forrest, 2006).

Rather than testing a single pathway (rank-order correlation) that represents development of self-control for an entire population this study identified four distinctive offending trajectory groups from Stage I (i.e., non-offenders, stable offenders, late-onsetters and desisters). According to Hay and Forrest (2006), absolute stability has significant implications for relative stability when distinctive patterns are identified. This allows the analyst to assess whether they involve shifts in self-control that significantly change individuals’ relative positions in the self-control distribution during the adolescence period.

Therefore, in order to test the relative stability hypothesis, this study graphically observed individuals’ relative positions in their levels of self-control evaluating whether
any of the trajectories traversed one another across five years. In other words, if any one or more of the four identified developmental trajectories of self-control fail to be similar to the others, it would indicate relative unstable over time. Similar with rank-order correlation approach, classification of developmental trajectory of self-control is ideally suited to testing relative stability of self-control (Hay & Forrest, 2006). “If so, it would indicate a certain degree of reshuffling of the self-control rank ordering” (Hay & Forrest, 2006, p. 756).

Figure 23. Four distinctive developmental offending trajectories groups’ estimated mean levels of self-control by age.

Figure 23 illustrates four estimated absolute mean levels of self-control in each group for the five time points. Each developmental trajectory of self-control provided measures to assess initial levels of self-control and whether the levels of self-control changed over time. Figure 23 illustrates that the trajectories of the non-offender group, which comprised 24.9% of the sample, had the highest stability in levels of self-control,
while the stable offender group, which comprised 16.6% of the sample, had the lowest stability in levels of self-control.

As shown in Figure 23, even though these two groups’ initial starting levels of self-control were different, only these two groups self-control remain constant relatively stable. In other words, the non-offender group’s developmental trajectories of self-control followed a similar trajectory to the stable offender group. These results suggest that the non-offender and the stable offender groups are relatively stable over time. Therefore, adolescents in these two groups, which were approximately 42% of the data, had relatively stable levels of self-control from age 15 to 19.

However, the trajectory of the LOG (approximately 32% of the sample) was not similar to the trajectory of the desister group. For example, the LOG had higher initial levels of self-control (20.62) at the first wave, yet by wave five had the lowest reported self-control (19.89) ($r = .37, p < .05$). In contrast, the desister group (approximately 21% of the sample) had the lowest initial starting point of self-control (19.45) at the first wave; however, mean levels of self-control increased to (20.48) at wave five ($r = .40, p < .05$). The LOG trajectory path decreased from age 15 through 19 and intersected with the desister group after age 17. Thus, the late-onset and desister groups’ adolescents’ trajectories were relatively unstable.

In summary, by examining the four distinctive developmental trajectories changes in self-control, the results indicated that approximately 42% of the sample revealed relatively stable levels of self-control over time. However, the majority of the sample (approximately 53%) demonstrated relatively unstable levels of self-control throughout the five waves.
Hypotheses Testing

The first research question was concerned with the existence of distinctive patterns of juvenile offending among South Korean youth. In order to address the first research question, Loeber et al.’s (1991) dynamic classification scheme were used to identify various models of the trajectory groups that included non-offenders, stable offenders, late-onsetters and desisters. For the first goal of this study, three latent growth models (i.e., stable offenders, late-onsetters and desisters) were developed to test the six research hypotheses for each group because the non-offender group indicated no variability of juvenile delinquency. Therefore, each of the three groups was tested separately for the first six research hypotheses (H1 through H6). The second goal of this study is to examine both the absolute and relative stability of self-control. To test the four research hypotheses (H7 through H10) regarding stability of self-control, correlation coefficients were calculated for each of the four groups.

Latent Growth Curve Models (H1 through H6)

The Stable Offender Group (Model 1)

The following hypotheses (H1 through H3) were developed to test the independent variables as time-invariant variables (i.e., gender, family monthly income, and maternal employment) that were static measures taken from the first wave.

Hypothesis 1 asserted that gender would be significantly related to delinquency over time. The hypothesis was supported because gender was found to have a significant effect on both the intercept and the slope factors on juvenile delinquency over time at the $\alpha = .05$ level.

Hypothesis 2 asserted that family monthly income would be significantly related to delinquency over time. The hypothesis was not supported because family monthly
income was not found to have a significant effect on both the intercept and the slope factors on juvenile delinquency over time at the $\alpha = .05$ level.

Hypothesis 3 asserted that maternal employment would be significantly related to delinquency over time. The hypothesis was not supported because maternal employment was not found to have a significant effect on the intercept factor and the slope factors on juvenile delinquency over time at the $\alpha = .05$ level.

The following hypotheses ($H4$ through $H6$) were developed to test the effects of the time-variant variables (i.e., attachment to parents and low self-control) that were measured at each wave over the five years.

Hypothesis 4 asserted that parental attachment would be significantly related to delinquency over time. The hypothesis was not supported because all five repeated measures of attachment to parents had no significant effect on all five repeated measures of juvenile offending at the $\alpha = .05$ level.

Hypothesis 5 asserted that low self-control would be significantly related to delinquency over time. The hypothesis was supported because all five repeated measures of low self-control were each found to have a significant effect on the five repeated measures of juvenile offending at the $\alpha = .05$ level.

Hypothesis 6 asserted that there would be an indirect effect of parental attachment on juvenile offending mediated through low self-control. The hypothesis was not supported because the five repeated measures of parental attachment were each found to have a non-significant effect on the five repeated measurements of low self-control at the $\alpha = .05$ level.
The LOG (Model II)

The following hypotheses \((H1 \text{ through } H3)\) were developed to test the effects of the time-invariant variables (i.e., gender, family monthly income, and maternal employment) that were static measures taken from the first wave.

Hypothesis 1 asserted that gender would be significantly related to delinquency over time. The hypothesis was not supported because gender was found to not have a significant effect for both the intercept and the slope factors on juvenile delinquency over time at the \(\alpha = .05\) level.

Hypothesis 2 asserted that family income would be significantly related to delinquency over time. The hypothesis was not supported because family monthly income did not have a significant effect on the intercept and the slope factors on juvenile delinquency over time at the \(\alpha = .05\) level.

Hypothesis 3 asserted that maternal employment would be significantly related to delinquency over time. The hypothesis was not supported because maternal employment did not have a significant effect on the intercept and the slope factor on juvenile delinquency over time at the \(\alpha = .05\) level.

The following hypotheses \((H4 \text{ through } H6)\) were developed to test the independent variables as time-variant variables (i.e., attachment to parents and low self-control) that measured over the five years.

Hypothesis 4 asserted that parental attachment would be significantly related to delinquency over time. The hypothesis was supported at age 17 because attachment to parents was found to have a significant effect on juvenile offending at the \(\alpha = .05\) level. However, the hypothesis was not supported for age 16, 18 and 19.
Hypothesis 5 asserted that low self-control would be significantly related to delinquency over time. The hypothesis was supported because all four repeated measures of low self-control had a significant effect on the five repeated measures of juvenile offending at the $\alpha = .05$ level.

Hypothesis 6 asserted that there would be an indirect effect of parental attachment on juvenile offending mediated through low self-control. The hypothesis was not supported because the four repeated measures of parental attachment were found to have a non-significant effect on the four repeated measurement of self-control at the $\alpha = .05$ level.

The Desister Group (Model III)

The following hypotheses ($H1$ through $H3$) were developed to test the independent variables as time-invariant variables (i.e., gender, family monthly income, and maternal employment) that were static measures taken from the first wave.

Hypothesis 1 asserted that gender would be significantly related to delinquency over time. The hypothesis was supported because gender was found to have a significant effect on the intercept and the slope factors on juvenile delinquency over time at the $\alpha = .05$ level.

Hypothesis 2 asserted that family income would be significantly related to delinquency over time. The hypothesis was not supported because family monthly income did not have a significant effect on the intercept and the slope factors on juvenile delinquency over time at the $\alpha = .05$ level.

Hypothesis 3 asserted that maternal employment would be significantly related to delinquency over time. The hypothesis was not supported because maternal employment
did not have a significant effect on the intercept and the slope factors on juvenile delinquency over time at the $\alpha = .05$ level.

The following hypotheses ($H4$ through $H6$) were developed to test the independent variables as time-variant variables (i.e., attachment to parents and low self-control) that measured over the five years.

Hypothesis 4 asserted that parental attachment would be significantly related to delinquency over time. The hypothesis was not supported because all four repeated measures of attachment to parents did not have a significant effect on juvenile offending at the $\alpha = .05$ level.

Hypothesis 5 asserted that low self-control would be significantly related to delinquency over time. The hypothesis was supported because all four repeated measures of low self-control were each found to have a significant effect on the five repeated measure of juvenile offending at the $\alpha = .05$ level.

Hypothesis 6 asserted that there would be an indirect effect of parental attachment on juvenile offending mediated through low self-control. The hypothesis was supported because parental attachment was found to have a significant effect on low self-control at the $\alpha = .05$ level at age 15, 17 and 18. Parental attachment at age 16 did not have a significant effect on self-control at the $\alpha = .05$ level.

Stability Hypotheses ($H7$ through $H10$)

To test the four research hypotheses ($H7$ through $H10$) regarding the stability of self-control, correlation coefficients were calculated for each of the four groups. However, hypotheses 7 and 8 were developed to test only the stable groups (i.e., non-offenders and stable offenders) and hypotheses 9 and 10 were developed to test the unstable groups (i.e.,
late-onsetters and desisters). Therefore, two research hypotheses were tested on each group separately.

The Stable Groups

The following hypotheses (H7 and H8) were developed to test both absolute and relative stability of self-control over the five years within stable groups (i.e., non-offenders and stable offenders).

The non-offender group.

Hypothesis 7 asserted that the levels of self-control within individuals (absolute stability) would be stable over time in the stable group of juvenile offenders. The hypothesis was not supported within non-offender group of adolescents because Pearson correlation coefficients were indicated lower than .60 between each wave over the five-year period.

Hypothesis 8 asserted that the levels of self-control between individuals (relative stability) would be stable over time in the stable group of juvenile offenders. The hypothesis was supported because the non-offender group’s developmental trajectories of self-control followed a similar trajectory to the stable offender group. In other words, levels of self-control between individuals within the stable groups (i.e., non-offenders and stable offenders) remained constant (the levels of self-control were parallel between those two groups).

The stable offender group.

Hypothesis 7 asserted that the levels of self-control within individuals (absolute stability) would be stable over time in the stable group of juvenile offenders. The hypothesis was not supported within the stable offender group of adolescents because correlation coefficients were indicated lower than .60 between waves over time.
Hypothesis 8 asserted that the levels of self-control between individuals (relative stability) would be stable over time in the stable group of juvenile offenders. The hypothesis was supported because the stable offender group’s developmental trajectories of self-control followed a similar trajectory to the non-offender group. In other words, levels of self-control between individuals within stable groups (i.e., stable offenders and non-offenders) remain constant (the levels of self-control were parallel between those two groups).

*The Unstable Groups*

The following hypotheses (*H9* and *H10*) were developed to test both absolute and relative stability of self-control that measured over the five years within unstable groups (i.e., late-onsetters and desisters).

*The LOG.*

Hypothesis 9 asserted that the levels of self-control within individuals (absolute stability) would be varying over time in the unstable groups of juvenile offenders. The hypothesis was not supported within the LOG of adolescents because correlation coefficients were indicated lower than .60 between waves over the five-year period.

Hypothesis 10 asserted that the levels of self-control between individuals (relative stability) would be unstable over time in the unstable groups of juvenile offenders. The hypothesis was not supported because the increasing trajectory of the LOG and decreasing trajectory of the desister group were unparalleled and dissimilar to each other.

*The desister group.*

Hypothesis 9 asserted that the levels of self-control within individuals (absolute stability) would be varying over time in the unstable groups of juvenile offenders.
The hypothesis was not supported within the desister group of adolescents because correlation coefficients were indicated lower than .60 between waves over the five-year period.

Hypothesis 10 asserted that the levels of self-control between individuals (relative stability) would be unstable over time within unstable groups of juvenile offenders. The hypothesis was not supported because the decreasing trajectory of the desister group and increasing trajectory of the LOG were unparalleled and dissimilar to each other.

Summary of Findings

For the first goal of this study, four different trajectory groups were found including non-offenders, stable offenders, late-onsetters, and desisters trajectory groups within the Korean youth panel data. The data was partitioned based on these trajectories in order to exam stable offenders (Model I), the late-onsetters (Model II) and the desister groups (Model III) for latent growth models. The results suggest that gender is a significant predictor of both the intercept and slope factors within the stable offender and the desister group, but it is not a significant predictor within the LOG. Family monthly income and maternal employment are not significant predictors within any of these groups. The most significant finding is a significant direct relationship between low self-control and juvenile delinquency, despite the fact development in low self-control covaries with development of juvenile delinquency over time. Parental attachment demonstrated no direct effect on juvenile offending for any of the three distinctive patterns. However, there is some evidence of indirect effects of changes in parental attachment on juvenile offending through low self-control over time. In other words, there is an indirect effect between parental attachment and juvenile offending through low self-control only among desisters.
For the second goal of this study, four distinctive patterns (i.e., non-offenders, stable offenders, late-onsetters, and desisters) were employed to test the stability self-control. The results indicate that absolute stability of self-control is not supported for each group. Furthermore, relative stability of self-control is supported only between the non-offender and stable offender groups. In other words, approximately 42 % of the sample who were categorized as stable groups (i.e., non-offenders and stable offenders) demonstrated relatively stable levels of self-control throughout the five waves. As predicted, 53 % of sample who were categorized in one of the unstable groups (i.e., late-onsetters and desisters) demonstrated relatively unstable in self-control throughout the five years. Discussed next is an interpretation of these findings and their impact on the distinctive developmental offending trajectories, LGMs, and correlation coefficients. Moreover, specific implications for theory and prevention, future research, and limitations of this study are discussed.
CHAPTER V
DISCUSSION

The primary purpose of this study was to identify developmental pathways of juvenile offending in South Korean adolescents between 15 and 19 years of age. The purpose of identifying developmental pathways was to determine what factors affect adolescents’ growth or change. The second component of this study examined the absolute and relative stability of self-control and its effects on reported juvenile delinquency. To assess these identified developmental pathways and the impact of self-control on juvenile delinquency five waves of the Korea Youth Panel Study (KYPS) data were employed applying Loeber et al.’s (1991) classification scheme, latent growth modeling (LGM), and correlation coefficients.

The LGM technique used in this study provided a systematic approach to evaluate the different trajectories of juvenile offending separately across a five-year period. The results of the data analyses and developed models provide insight into each of this study’s six research questions. Furthermore, this study confirms findings from other studies and provides new information regarding the influence of certain variables on the developmental trajectory of reported juvenile delinquency. Results from this analysis also provide strong support for the role of control theory and life-course theory in explaining juvenile delinquency. This chapter provides the evaluation and interpretation of findings for each research question including characteristics of offending trajectories, risk factors associated with certain offending patterns (i.e., both time-stable and time-variant covariates), and stability of self-control. Moreover, specific implications for theory and prevention, advantages of the LGM, future research, and limitations of this study are reported.
Summary of Findings and Discussions

Characteristics of Juvenile Offending Trajectories

The first two research questions are concerned with the distinctive patterns of delinquent behavior during adolescence. There were four developmental trajectories of juvenile offending that were identified among South Korean youth which were identified between ages of 15 and 19 (non-offenders, stable offenders, late-onsetters and desisters). This study’s findings are consistent with previous studies in identifying developmental trajectories that indicated various patterns of juvenile offending during the adolescence period (e.g., Ayers, et al., 1999; Chung, et al., 2002a & 2002b; Fergusson, et al., 2000; Loeber, et al., 1991). Some of these offending trajectory patterns are similar to trajectory patterns found by other developmental studies.

The first pattern identified in this study, the late-onsetter group (LOG), comprised approximately 32% of the sample. This group of adolescents reported no involvement in offenses in the first year of study, but then reported increasing involvement in the four years thereafter. This is the largest developmental pattern of juvenile offending among South Korean adolescents. This LOG pattern is similar to what has been termed “adolescent limited offenders” (ALs) and “late-onset desisters” described by Moffitt (1993) and Patterson et al. (1991), respectively. Also, similar patterns can be found in other studies as “starters” by Loeber et al. (1991) and “initiators” by Ayers et al. (1999). This similar grouping consistently suggests that this group of adolescents’ offending trajectory pattern increased steadily and did not decline until the onset of adulthood (Ayers, et al., 1999; Chung, et al., 2002a & 2002b; Loeber, et al., 1991; Moffitt, 1993; Patterson, et al., 1991).
Within this study, the LOG pattern is limited to the participants’ offending during the adolescent period who stopped their offending prior to the onset of adulthood. It should be noted that the LOG of adolescents may not be homogeneous because some individuals may desist later in life but some individuals may not. According to Nagin, Farrington, and Moffitt (1995), adolescence-limited offenders (ALs) had desisted from officially recorded offending around age 20, but this group of individuals continued to commit minor offenses (i.e., heavy drinking, fighting, and using drugs) up to age 32.

The second pattern identified in this study, the desister group, comprised approximately 21% of the sample, which was the third largest group preceded by the non-offender group (25%). This trajectory pattern is inconsistent with previous classifications by Moffitt (1993) and Patterson et al. (1992) who did not identify this trajectory. However, the desister group has been identified in more recent studies that classified desisters as juveniles who initially reported moderate offending at the first year of study and then reported high rapid lower levels of involvement until eventually reporting no involvement in delinquent activities (e.g., Ayers et al., 1999; Chung, et al., 2002a & 2002b; Loeber, et al., 1991).

Like the trajectory patterns report, both desisters and late-onsetters are limited in their offending during the adolescent period and they both stopped their offending prior to the onset of adulthood. However, those patterns are more substantially different, because findings from this study and other studies consistently predict that the desister group of adolescents desisted from various offenses by themselves before entering adulthood. In contrast, late-onsetters desisted from socially unacceptable behavior when they entered adulthood, because this type of delinquent behavior (minor offenses) is no
longer considered as criminal (Ayers, et al., 1999; Chung, et al., 2002a & 2002b; Loeber, et al., 1991; Moffitt, 1993). In other words, although these two groups stopped their offending at the onset of adulthood, developmental path trajectories for each group should be different later in life, because the desister group terminated all involvement in delinquent behavior while late-onsetters’ delinquent acts were simply no longer defined as delinquent.

The last pattern identified in this study, the stable offender group, comprised approximately 17% of the sample. This group of adolescents reported some levels of consistent involvement in delinquency during the study. This group is comparable to the “chronic offenders” group identified by Chung et al. (2002a & 2002b), the “life-course persisters” group labeled by Moffitt (1993), and the “early-onset persisters” group described by Patterson et al. (1992). Similar to the patterns of stable offenders in this study these patterns consistently demonstrate that there is a significant reduction in criminal involvement throughout the life-course; however, there is consistently some degree of involvement in criminal activity.

The identified stable offender group pattern in this study is also similar to “escalators” identified by Chung et al. (2002a & 2002b). Chung et al.’s (2002a & 2002b) described the escalator group as adolescents who were consistently involved in delinquent behavior over time; however, the escalator group pattern indicated a commitment increasingly serious offense over time, while the stable offender or chronic pattern offender’s offenses became less serious over time. Although escalators’ and chronic offenders’ patterns were identified as different patterns, Chung et al. (2002a
&2002b) assert that the escalator group can be viewed as a subset of the chronic offender or stable offender group pattern.

There is a vast amount of empirical evidence that supports the presence of the traditional age-crime curve as a single developmental trajectory. However, “empirical evidence on the age-crime curve seems to indicate that the observed rise in offending during adolescence hides distinctive developmental pathways within the offending population” (Yessine & Bonta, 2008, p. 436). The traditional age-crime curve is not viable for measuring the effects in developmental trajectories and patterns within juvenile offending (Ayers, et al., 1999; Chung, et al., 2002a & 2002b; Hay & Forrest, 2006; Loeber, et al., 1991). A single or dual developmental trajectory (i.e., non-offenders and offenders) is typically assessed from aggregate-level data and collapses data into aggregate-level patterns. These patterns have failed to account for different types of individual trajectories among offenders (Nagin, Farrington, & Moffitt, 1995). The different offense types should be considered separately to assess the effects of the various independent variables on changes in various types offending (Barnett, Bluemstein, & Ferrington, 1987). Thus, in order to strengthen the explanation of changes in developmental patterns of juvenile delinquency offending trajectories need be measured by partitioning the various patterns into distinct groups. This is imperative to assess the specific effects of control theory on delinquent behavior (Wiesner & Windle, 2004) as well as to further explain the diverse etiologies embedded in each trajectory (Chung, et al., 2002b).

It is important to note that most studies of traditional age distributions of crime (a single trajectory) and multiple trajectories used self-reported (follow-up survey) data.
This is one of the primary concerns in the process of identifying offending trajectory patterns. This approach may yield inaccurate and invalid results because juveniles may underreport or overreport in their juvenile offending due to inaccurate recall or purposeful deception (Huizinga, 1990). Lauritsen (1999), who used longitudinal data from the National Youth Survey (NYS), found that there is decreasing criminal involvement within almost all types of juvenile delinquent behaviors after the first wave of interviews. Furthermore, those who have higher-rate juvenile offenders are less likely to report their offending than those who commit lower levels of offending offender (Huizinga, 1990). Moreover, higher-rate offenders tend to inaccurately recall or lie about the number of times they have been involved in juvenile offending (Huizinga, 1990). More specific limitations of self-report survey are discussed in the limitation section.

**Risk Factors Associated with Offending Trajectories**

The Korea Youth Panel Study (KYPS) data was partitioned into three subgroup models (i.e., stable offenders, late-onsetters, and desisters) by applying Loeber et al. ’s (1991) classification scheme for Stage I. Latent growth models (LGMs) were then conducted on each group in an attempt to answer the following research questions: “Are there time-invariant and time-variant predictors associated with certain patterns of delinquency over time?” and “Are there indirect effects between parental attachment and low self-control on juvenile delinquency?” The second stage of the analysis involved adding variables to determine the effects of family roles, on changes within delinquent involvement over a five-year period. Furthermore, additional regression parameters were added to the model to examine the direct and indirect effects of low self-control and parental attachment (when controlling for demographic measures) on juvenile
delinquency. These three models were analyzed within the full model to determine the best fit model.

The results of this study from the LGM from each group provide some support for control theories. The results demonstrate that there was a consistent relationship between changes in low self-control and changes in juvenile offending. While there was neither a consistent positive nor inverse relationship low self-control was nonetheless a significant predictor of juvenile offending. In other words, adolescents who reported increases in juvenile offending concurrently experienced decreases in levels of self-control and vice versa. In the same sense, this study’s finding is consistent with prior cross-sectional research; low self-control is consistently associated with juvenile offending within a multitude of samples and in a variety of contexts (Pratt & Cullen, 2000).

Furthermore, the findings of this study suggest that there appeared to be no significant evidence of a direct relationship between changes in parental attachment and juvenile offending. When mediating for low self-control, the indirect relationship between parental attachment and low self-control remained nonsignificant with the exception of the desister group. To explain further, this study’s findings suggest that only within the desister group parental attachment contributes significantly to the model when self-control is included as a mediator variable. More specific implications of these findings are discussed next in implication of theory section.

**Stability of Self-control**

The secondary aim of this study was to assess the Gottfredson and Hirschi’s (1990) second proposition of self-control theory (stability hypothesis) in a longitudinal investigation of South Korean youth. Pearson correlation coefficients were conducted in an attempt to answer the following research question: “Do the levels of self-control
remain stable over time?" Based on classification of juvenile offending from Stage I participants were classified into four groups determined by their patterns of delinquent activity during the five-year period (i.e., non-offenders, stable offenders, late-onsetters, and desisters). Contingent upon these classifications, each group (between each wave over the five-year period) is separately assessed through correlation coefficients to determine the consistency of self-control over time.

However, the assumption that self-control is exhibits absolute stability over time is not supported by the result of this study. While the present results indicated some evidence of absolute stability in self-control for those participants who were both classified as the non-offender group (24.9% of the sample) and the stable offender group (16.6 % of the sample), this evidence becomes substantially more significant when accounting for the slight increase in the absolute levels of self-control and, those individuals remain relatively stable over time. However, the same did not hold true for those within the unstable groups; the desisters (20.8% of the sample) demonstrated a substantial increase in the levels self-control and the LOG (32.3 % of the sample) consistently decreases in the levels of self-control. In other words, the LOG, approximately 32 % of the sample (the most prevalent trajectory pattern among South Korean youth) declines in the levels of self-control while offending trajectory increases. This is consistent with Hay and Forrest’s (2006) findings. They found that approximately 16 % of respondents who fit into trajectories marked by absolute stability decrease in levels of self-control over time. Also, these groups of adolescents are relatively unstable over time. This result contradicts Gottfredson and Hirschi’s (1990) stability hypothesis, which claims that one’s level of self-control is acquired in childhood (by age 8 to 10),
that levels of self-control never decline and differences in low self-control between individuals are relatively stable.

**Theoretical and Empirical Implications**

Control theory is the most frequently tested theory in the field of criminology; however, limited research has been conducted on the theory using longitudinal data. The results of this study’s findings provide important theoretical and empirical implications, specifically, regarding the interdependency between social bonds and self-control, as well as the two core propositions of the general theory of crime.

*Interdependency between Social Bonds and Self-control*

The findings of this study demonstrate that social control and self-control are interdependent. In this study, a series of latent growth model (LGM) specified an indirect effect on juvenile offending based on the assumption that weak social bonds directly contributed to delinquency (Hirschi, 1969) and the parental attachment aspect of the social bonds (as external control) was linked to the development of self-control as internal control (Gottfredson & Hirschi, 1990). In other words, social control and self-control theory may be able to be integrated to better explain certain patterns of juvenile offending (Hirschi, 2004).

Gottfredson and Hirschi (1990) did not explain how their self-control theory relates to social bonds; however, Wright, Caspi, Moffitt, and Silva (2001) suggest that social bonds and self-control have interdependent effects on delinquency and crime. In other words, social bonds (specifically parental attachment) are related to the development of low self-control and it should have a direct effect on juvenile offending (Vowell, 2007). Therefore, it may be that social bonds affect crime only indirectly, through their effects on low self-control (Akers & Sellers, 2004).
A number of studies have linked social bonds and self-control as interdependent in juvenile offending and examined how they interact with one another (Nakhaie, Silverman & LaGrange, 2000). These studies have consistently demonstrated interdependent effects between social bonds and self-control on juvenile offending (e.g., Bouffard & Rice, 2011; Longshore, et al., 2005; Wright, et al., 2001; Wright, Caspi, & Silva, 1999; Vowell, 2007). However, it is difficult to strengthen this claim. First, the prior research has not always tested all four bonding factors and the varied studies have operationalized the elements of social control and self-control differently (Longshore, et al., 2005; Pratt & Cullen, 2000). Second, most of the previous findings resulted from cross-sectional studies, which limits the ability to empirically assess the correlations between self-control and social control (De Li, 2004). Lastly, some studies found indirect effects of social bonds on juvenile offending through self-control (e.g., Bouffard & Rice, 2011; Vowell, 2007); others found that there are indirect effects of self-control on offending through elements of social control (e.g., Longshore, et al., 2005; Wright, et al., 2001; Wright, et al., 1999).

When testing Gottfredson and Hirschi’s (1990) stability hypothesis some studies have treated low self-control as a personal trait (propensity) that is stable over time hypothesizing that social bonds mediate the effects of low self-control on juvenile offending (e.g., Longshore, et al., 2005; Wright, et al., 2001; Wright, et al, 1999). However, other studies have treated low self-control as a mediating factor between social bond and juvenile offending because they contend that low self-control is not a fixed personality trait (e.g., Bouffard & Rice, 2011; Hope, Grasmick, & Pointon, 2003; Vowell, 2007). More specifically, they believe individual experience changes individuals’ levels
of self-control throughout the life-course. Similarly, there are some studies that have addressed important issues regarding the relationship between family variables and low self-control; specifically, Hay and Forrest (2006) have focused on low self-control as a dependent variable and found that parental socializations (i.e., parental discipline, monitoring, and attachment) are significant predictors of changes in levels of self-control.

This study attempts to examine some of the implications of the aforementioned control theories in order to explain the direct and indirect effects of parental attachment and low self-control and how the two are interrelated within LGMs. This study’s findings suggest that there is no strong evidence of significant indirect effects of changes in levels of parental attachment on juvenile offending through low self-control. However, in this analysis parental attachment only contributes to the model when mediating for low self-control and only for the desister group. This is consistent with Ayers et al.’s (1999) identification of various developmental trajectories that indicated desisting adolescents were significantly more attached to parents.

As stated in the literature, two interrelated components arise during the desistance process. The first component is the situational changes of social bonds, especially parental attachment during the adolescence period. The second component is social-cognitive indicators (i.e., motivation) as a form of internal control (Giordano, et al., 2002; Maruna, 200; Sampson & Laub, 2003). As a process of desistance from crime, those two components are interrelated with changes in social bonds (i.e., external factors) to changes in low self-control (i.e., internal factors). For South Korean youth, perhaps social bonds (i.e., parental attachment) in adolescence are an important factor in desistance. Currently, there are numerous cross-sectional studies found in the literature. This study
provides an important contribution to the literature by analyzing longitudinal data to examine the indirect effects among relevant control variables.

*General Theory of Crime*

One of the purposes of this study was to assess Gottfredson & Hirschi’s (1990) two core propositions of general theory of crime: (1) the first proposition of self-control theory (low self-control as the cause of criminal behavior), and (2) the second proposition of self-control theory (the levels of self-control relatively stable over the life-course). The results from this analysis support some of the tenets of Gottfredson and Hirschi’s (1990) *A General Theory of Crime*, but they also refute others.

*The first proposition of self-control theory.*

Life-course theory has received a vast amount of attention in the last twenty years. Prior research found a traditional age-crime curve (a single developmental trajectory) indicating that delinquent behavior escalates during early adolescence, peaks sharply in late adolescence and then decreases in early adulthood (e.g., Moffitt, 1993; Loeber, et al., 1991; Patterson, et al., 1991; Sampson & Laub, 2003). However, as noted above, a single developmental trajectory is typically assessed from aggregate-level data that represent whole populations. This approach is unable to detect individual differences. Thus, the different offense trajectories should be considered separately (Barnett, et al., 1987) in order to examine the effects of changes in low self-control on changes in juvenile offending.

Recently, theories have begun to focus on how various social constructs affect individuals differently throughout the life-course and how this may relate to individuals’ propensity to commit deviant acts. Accordingly, the results of this study have important
methodological implications to self-control theory regarding the importance of classifying juveniles into various developmental trajectories in order to further understand how low self-control affects patterns of juvenile offending. Moreover, the data were constructed into a time-varying covariate model in order to further understand whether development in low self-control covaries with development in juvenile delinquency over time.

From this developmental perspective perhaps the most important finding of this study is that there are consistent significant relationships between changes in low self-control and changes in juvenile offending over the five-year period. In other words, there is strong evidence that the first proposition of self-control theory (low self-control as the cause of criminal behavior) from a longitudinal perspective is supported. More specifically, although different groups were identified in their patterns of juvenile offending, each group’s pattern of low self-control indicated statistically significant relationships with delinquency.

For example, adolescents who reported increases in juvenile offending concurrently experienced decreases in levels of self-control, and vice versa. Thus, this study introduces a new methodological technique by classifying distinctive trajectories rather than relying on a single developmental trajectory to analyze adolescents as one group. This study is important because almost all published findings about self-control theory have relied on cross-sectional data. Additionally, this study, using longitudinal data, provides a more comprehensive and sophisticated analysis of the effects of social control on juvenile delinquency.
The second proposition of self-control theory.

This study also examined Gottfredson and Hirschi’s (1990) stability hypothesis. These results suggest that while the first proposition of Gottfredson and Hirschi’s (1990) self-control theory was strongly supported, the second proposition of the theory (stability hypothesis) was not supported. The hypotheses for both absolute and relative stability of self-control were not supported in this study when using longitudinal data. When controlling for individual differences, the results of this study indicated while self-control was stable for some it was unstable for others. According to Gottfredson and Hirschi (1990), absolute levels of self-control (within individuals) may have a gradual and slight increase in levels of self-control; however, it is the relative levels of self-control (between individuals) that should remain constant regardless of the introduction of various control factors throughout the life-course. An examination of the trajectories of the LOG in this study did not provide support for the stability hypothesis. Furthermore, while the non-offender, stable offender, and desister groups of adolescents showed a slight gradual increase in the levels of self-control as the theory hypothesized, the LOG showed a slight gradual decrease in the levels of self-control.

The LOG of adolescents exhibited the highest frequency of reoccurrence patterns (32.3% of the sample) in juvenile offending among South Korean youth. This group’s pattern demonstrated that the absolute levels of self-control declined over the five years examined. In addition, their trajectory was not parallel to other trajectories and were relatively unstable. It should be noted that the decreasing levels of self-control in the LOG over time are not sufficient to indicate measurement error. This result is consistent with Hay and Forrest’s (2006) findings that there is observed variation in levels of self-
control. Their finding indicated that approximately 16% of the sample experienced absolute decreases in levels of self-control and their trajectories were not parallel to other trajectories. Low self-control was not stable in the absolute or relative stability proposition within this study. It is thus concluded that because decreasing levels of self-control are a significant predictor of increasing juvenile offending, for each year, then Gottfredson and Hirschi’s (1990) stability hypothesis is not supported by the results of this study.

Furthermore, this study’s findings introduce a new methodological approach to assessing how self-control affects individual differences in juvenile delinquency. Even though self-control theory is one of the most tested theories there are few empirical studies which have directly tested the second proposition of self-control theory (stability hypothesis). This is may be due to the lack of longitudinal data. However, the study of the individual differences in the delinquent behavior literature (classification of juvenile offending) recently has received more attention resulting in the discovery of distinctive developmental trajectories of juvenile offending (e.g., Ayers, et al., 1999; Chung et al., 2002a & 2002b). These findings question whether low self-control is a static personal trait as has been assumed (Nakhaie, et al., 2000) and suggest instead that low self-control is a dynamic personal trait that varies over time.

Previous studies on the stability of self-control have been limited by a number of methodological concerns. To date there are only eight published self-control studies specifically testing the stability thesis (e.g., Arneklev, et al., 1998; Beaver, et al., 2008; Burt, et al., 2006; Hay & Forrest, 2006; Mitchell & Mackenzie, 2006; Raffaelli, et al., 2005; Turner & Piquero, 2002; Winfree, et al., 2006). However, only one study employed
group-based modeling to identify the trajectory patterns of self-control as multiple trajectories (Hay & Forrest, 2006). Some studies such as Turner and Piquero’s (2002), Mitchell and MacKenzie’s (2006) and Winfree et al. (2006) compared offender and non-offender groups as dual trajectories. Lastly, all others tested the aggregated mean levels of self-control as a single developmental trajectory to test the stability hypothesis.

As previously stated, most studies that have examined the stability hypothesis of self-control employed aggregate measures of self-control as a single trajectory. This is the simplest interpretation of the stability thesis as it examines the initial level of self-control and how that level changes (Hay & Forrest, 2006). Similarly, dual trajectories (i.e., non-offenders and offenders) should exhibit significant stability in low self-control because offenders generally were found to have consistent lower levels of self-control, while non-offenders were found to have consistent higher levels of self-control over time. The aforementioned approach is fallible as it does not consider individual differences in the variations of low self-control. This approach fails to assess the possibility that individuals’ level of self-control may change differently over time. In other words, the aggregate mean levels of self-control for a sample as a single trajectory may obscure significant variation among individuals (Hay & Forrest, 2006).

Based on prior empirical research and this study’s findings more research should be conducted to determine the stability of self-control as the stability hypothesis may be falsified when controlling for developmental trajectories. In recent years, there has been increased interest in testing the stability of self-control. However, there are only eight studies testing stability that appear in the current published literature. Thus, there is no general consensus on the stability of self-control throughout the life-course. In order to
address these concerns and to provide insight to further develop self-control theory
further research is needed on the stability thesis. Also, it suggested that the issue of
stability of aggregate mean levels should be assessed separately using homogeneous
trajectory groups to account for individual differences.

Policy Implications

One of the main goals in this study was identification of juvenile offending
trajectories. The hope was that these trajectories could help explain juvenile delinquency
and thus provide some preventative measures of adult criminality. Loeber et al. (1991)
defined preventive intervention for juvenile offending as follows: “concerns the reduction
of juveniles’ initiation in offending and the reduction in the likelihood of their escalating
to more serious forms of delinquency” (p. 81). According to this definition, classification
of juvenile offending and analysis of LGMs provide valuable guidance for prevention of
not only juvenile offending during the adolescence period, but also crime in adulthood.

First, from the developmental perspective, early intervention reduces delinquent
involvement, as well as alcohol and drug abuse, drunk driving, sexual promiscuity, and
family violence (Laub & Sampson, 2003). Furthermore, early intervention has found to
be one of the most effective means of preventing delinquency (Ramey & Ramey, 1992).
However, the problem lies in whether the distinctive offending trajectories can be
identified prior to the actual offending. The characteristics of each developmental
offending trajectory (based on growth rate of offending) provide valuable knowledge that
help to predict future patterns, especially within the individuals who are at a high risk to
commit crime in adulthood. In other words, resources can be employed early in the
course of development to allow for intervention at the initial detection of problematic
behavior (Yessine & Bonta, 2009). Therefore, identification of juvenile offending can
specify what stage is likely to begin next for those adolescents who have gone through the early stages of known pathways into delinquency and adult criminality (Chung, et al., 2002a & 2002b).

This study identified four offending trajectory groups (i.e., non-offenders, stable offenders, late-onsetters, and desisters). The LOG (comparable to the adolescent limited offenders) is one of the most prevalent offending groups among South Korean youth. This group of adolescents reported no delinquent involvement at age 15 but reported increased involvement each year up to the age 19 where only minor offending was reported. These minor offenses (i.e., minor offense) include smoking, drinking, having unexcused absences, running away from home, and having sex. According to Moffitt (1993), this group of adolescents’ pattern possibly could be explained by the “maturity gap,” which is the contradiction between biological/psychological change (i.e., growth and maturity) and society’s expectations of acceptable behavior.

As Moffitt’s (1993) theory predicted, the LOG offenders among South Korean youth automatically desist (such as age-related decline) from socially unacceptable behavior. This was only because they had graduated high school and entered college, meaning behavior previously considered to be minor offenses were no longer classified as delinquent behavior, as its delinquency was contingent on the participants’ ages. However, the stable offender group raises vast concerns (16.6 % of the sample), because this group of adolescents are consistently involved in moderate or serious levels of offending during adolescence (from age 15 to 19). According to Moffitt (1993), this group of adolescents (which is comparable to the life-course persister) is more likely to be involved in serious criminal offending that continues into adulthood. Therefore, this
group of adolescents should be of most concern for intervention by the criminal justice system. Ayers et al.’s (1999) study provided similar implications, that any efforts to prevent and reduce juvenile offending must deal with serious and chronic offenders because those adolescents most likely to become such offenders later life.

In general, if there are distinctions in developmental offending trajectories, then it is plausible that employing the same intervention techniques will provide varying results (Chung, et al., 2002a & 2002b). Barnett et al. (1987) suggested the importance of identifying patterns of offending as it allows for efficient use of prosecution resources as well as institutional and other treatment facilities which could be used more selectively for those higher-rate offenders. This strategy might prevent or reduce a significant amount of criminal activity. Therefore, as this study’s findings suggest, if individual differences (e.g., distinctive patterns of juvenile offending) exist, different preventive intervention programs may be necessary for different developmental trajectory groups.

Second, from the analysis of LGMs, there is reason to be concerned with social control’s associated risk factors for juvenile offending. As results of this study suggest individuals’ levels of self-control have a strong effect on the developmental trajectory of juvenile offending over the life-course. For example, adolescents who reported increases in juvenile offending concurrently experienced decreases in levels of self-control and vice versa. Therefore, understanding variability of low self-control associated with juvenile offending may provide valuable information in developing effective juvenile intervention programs when designing prevention and intervention strategies for juvenile delinquency. Evaluations of crime prevention programs have commonly measured deterrent effects across the general population, but there may be more effective means to
preventing or reducing offending among low self-control and criminality prone (Wright, Caspi, Moffitt, & Paternoster, 2004).

According to Borduin, et al.’s, (1995) study, multi-systemic treatment of serious juvenile offenders has an effect on the development of low self-control and can successfully reduce criminal activity and violent offending among serious juvenile offenders. They used a multi-systemic approach with therapeutic interventions, which were designed to reduce serious or chronic juvenile offending based on family and community based treatment (Borduin, et al., 1995). This treatment typically aims to improve and enhance family relations (Borduin, et al., 1995). As results from this study’s LGMs suggest family socialization is a key factor in explaining increasing levels of self-control, particularly only in the desister group. It is the individual’s motivation that has the strongest affect on the likelihood of desistance when pro-social elements are introduced (Laub & Sampson, 2003; Giordano, et al., 2002; Maruna, 2001). Consistent with previous findings regarding the importance of the role of family these findings also suggest that supporting families in efforts to appropriately socialize their children may increase levels of self-control to decrease juvenile offending.

Advantages of the LGM Framework

As previously stated, most of the previous studies on juvenile delinquency have used cross-sectional data. Since longitudinal data has become more readily available there has been a vast increase in empirical studies that focus on the effects and changes of delinquent behavior among juveniles using various latent growth models (LGMs). One of the key advantages of LGM is that it can be employed to determine how the change in one variable affects the change in another variable over time (Duncan, et al., 2010). However, it is imperative to note that there are a variety of statistical models that can be
extended within a basic LGM because of the numerous numbers of possible research questions and different data structures (Duncan, et al., 2010).

Over the past decades various extension models have been employed in criminological studies. To date, there are a number of studies that have assessed longitudinal data by applying LGM within structural equation modeling (SEM). Furthermore, the basic LGM can be extended to test other hypotheses through its ability to include time-variant and invariant variables within one model (Kline, 2005). Curran et al. (1997) contended that in order to examine whether variables change together over time new time specific methods (i.e., time-varying covariates model) were needed to develop a more complete understanding of individual differences. One of the strengths of the new time specific methods are their capacity to incorporate “time-varying covariates” to examine the impact of change in developmental trajectories (Duncan, et al., 2010).

Such models provide a powerful statistical method for analyzing predictors as time-variant variables. These time-varying predictors are themselves repeated measures typically measured at the same intervals as the indicators of the latent growth factors (Kline, 2005). In other words, this extension LGM provides a more dynamic assessment of the correlates of individual differences and how those changes over time can be associated with development in another variable (Duncan, et al., 2010).

Despite many advantages that LGM offers it is not always the appropriate analytical method for longitudinal studies. According to Duncan et al. (2010), the most commonly cited limitations of LGM within a SEM framework is the basic assumption that a continuous dependent variable measured at least three times on the same interval is required (see Chapter III). However, since new various extension models have developed,
ambiguity of the interpretation of results is often stated as a disadvantage of LGM. According to Curran et al. (1997), it has been very difficult to analyze change in a particular construct as a function of change in status because both the dependent and independent variables change over time. Employing time-varying covariates within a LGM is a relatively new technique and may lead to some issues in how models are selected until more formal guidelines are developed (Duncan, et al., 2010).

However, LGM is an important new development in the study of life-course criminality. The extension of the LGM approach employed in this study is strengthened by adding the time-varying covariates within the general LGM framework. This new LGM (i.e., time-varying covariates model) enables the researcher to examine the influence of changes in low self-control and parental attachment on the developmental growth trajectory of delinquent behavior among South Korean youth. This new approach offers the potential for providing new insight and the development of more complex behavioral theories of development among a plethora of behaviors (Duncan, et al., 2010).

Limitations

This study has several limitations that should be considered when interpreting the findings. One of the primary concerns that arose from using secondary data is the limit of variables and construction of scales from the original study. Thus, there are some distinct differences in operationalization of variables from the data being used and the variables that have been used in past self-control studies. For example, there are a variety of methods that have been employed to measure low self-control. In this study, measurement of Gottfredson and Hirschi’s (1990) low self-control (as a unidimensional factor) was used which is commonly used in other studies. Therefore, other studies using other scales may provide different results.
In addition, measurement of familial influence is limited because the data does not provide any measures of the quality of parenting. Therefore, to represent quality of parenting, the analyst used a dichotomous variable measuring whether the mother was employed. This question was asking about the status of their mother’s employment, which did not provide specific information about quality of parents. For example, some parents who work outside the home do a much better job parenting than do parents who are home all the time. In the South Korean culture, it is often the role of the grandparents who are deemed the primary parent and the appropriate parenting style; particularly among those families where the mother works out of the home. Therefore, maternal employment status may not fully represent quality of parenting.

As previously stated, the data were obtained through self-report survey instruments, which results in multiple limitations. Participants were asked to report the frequency of their behaviors over the past year. This can lead to inaccurate and invalid results because participants may underreport or overreport in their juvenile offending (Hagan, 2003). A longitudinal study from the National Youth Survey (NYS) data found that there are decreasing crimes regarding almost all types of juvenile delinquent behaviors after the first wave of interviews (Lauritsen, 1999). Moreover, the first year of study (during the follow-up survey) reported highest involvement of most of delinquent crime but gradually declined thereafter. Hence, especially in longitudinal study (i.e., follow-up and self-report), there are possible threats to internal validity, specifically testing and maturation effects which can increase the likelihood of invalid and inaccurate results (Hagan, 2003).
Third, it is important to note that this study assessed the five-wave panel that measured participants from age 15 to 19. This follow-up survey did not measure individuals’ behaviors before ages 8 to 10, which according to Gottfredson and Hirschi (1990) is the age that one’s low level of self-control is permanently established. In the present study, it was not possible to track whether those adolescents’ levels of self-control were different before ages 8 to 10. This study only examines the stability of self-control of individuals during adolescence period (from age 15 to 19).

Lastly, there are important methodological limitations associated with classification of juvenile developmental trajectory. In order to account for individual differences in juvenile delinquency, a number of statistical techniques have been advanced in recent years. This study was designed to investigate individual differences in juvenile delinquency that resulted in homogenous clusters of individuals who followed similar developmental pathways during the adolescence period based on three important behavioral trajectory characteristics (i.e., increase, decrease, or stable) within self-reported offenders. The discrepancy in characteristics of offending trajectories could be attributable to differences in methodological and statistical techniques. Therefore, each classified group’s adolescents may not be homogeneous. For example, the stable offender group in this study could potentially be classified as high stable, medium stable, and low stable chronic offenders based on the levels of seriousness offense scale. However, this study considered that those distinctive groups were just a subset of the overall stable offender group.
Implications for Future Research

The results of the current study provide new insights into existing literature on developmental theory and control theory for additional research. This study’s findings make a useful contribution to assess the validity of Gottfredson and Hirschi’s (1990) self-control theory from a developmental perspective. This study revealed partial support of their theory because some of the adolescents experienced change in the levels of self-control by applying time-varying covariate LGM. LGM can be developed and extended to examine potential mediators that affect changes in low self-control within developmental offending trajectories. In order to provide better prevention and intervention strategies it is important to understand why some adolescents may continue to commit crime while others desist or never have initial involvement.

The most prominent finding of this study is that when offending trajectories increased, the levels of self-control decreased, and vice versa. According to Moffitt (1993), developmental offending patterns are explained by dynamic reciprocal relationships between neuropsychological deficits and social environmental factors, as well as between biological traits and society’s expectations of acceptable behavior. Therefore, future studies should directly test the sources of socialization (other than role of parents) that contribute to the development of low self-control as well as its changes throughout the life-course. In other words, to develop a more efficient prevention program, future research should focus on how variability in specific social, environmental or biological factors (a broad range of risk factors as time-varying covariates) influences the levels of self-control that may be associated with certain developmental trajectories.
It is important to note that this study operationalized minor offenses as status offenses based on the degree of offense seriousness scale (e.g., Ayers, et al., 1999; Chung, et al., 2002; Loeber, et al., 1991). In general, the definition of a status offense is an action that would not be considered a crime if committed by an adult (Siegel & Welsh, 2005). However, the definitions of status offenses and legal age restrictions are different between the U.S. and South Korea. This longitudinal study identified distinctive patterns of juvenile delinquency during adolescence, designated from ages 15 to 19. Because the definitions of status offenses and age restrictions vary, some of the identified trajectories in this study may differ from other studies conducted in the U.S. Therefore, future studies should consider the impact of combining status and delinquent offenses as a single measurement of crime in the calculation of trajectories.

Furthermore, females continue to be underrepresented in developmental trajectory and stability of self-control studies. It is recommended that females be classified into their own developmental trajectories. Comparisons between male and female groups will provide more understanding for developing juvenile offending education programs. Lastly, future research should examine additional studies in different populations of adolescents. Also, this study should be extended to track offender groups of adolescents (especially stable offenders) over follow-up periods that extended into late adulthood.

Conclusion

Control theory is typically assessed through internal controls (Reckless, 1961; Reiss, 1951) and external controls such as parental attachment (Hirschi, 1969), as well as through other social bonds (Hirschi, 1969) and/or stakes in conformity (Toby, 1957). However, much of the past literature that has examined the effects of juvenile delinquent
trajectories has failed to control for variability in parental attachment and low self-control (Pratt & Cullen, 2000). By failing to account for these measures, the ability to assess any generalizable conclusions about the effects of family roles on low self-control and how directly and indirectly family roles affect changes and patterns in delinquent involvement has been constrained. Thus, control theories are grounded in the belief that the role of the family provides significant explanation of juvenile delinquency within an individual.

Recently individual differences in juvenile offending have received considerable attention in the field of criminology. One reason is that a single developmental trajectory is typically assessed from aggregate-level data, and thus collapses data into aggregate-level patterns, which in turn, fail to account for individual differences (Nagin, Farrington, & Moffitt, 1995). Therefore, in order to contribute to this gap in the literature, this study identified the distinctive developmental trajectories of juvenile offending by examining risk factors identified by prior tests of control theory.

From this developmental perspective the results of this study have important implications to control theory, specifically regarding interdependency between social bonds and low self-control, as well as the first proposition of self-control theory (low self-control as the cause of criminal behavior) and the second proposition of self-control theory (stability hypothesis). These results provide some support for the propositions of self-control theory; however, they also refute others. For the first proposition, this study’s finding is consistent with prior research that low self-control is consistently associated with juvenile offending within a multitude of samples and in a variety of contests (Pratt & Cullen, 2000). Even though this study identified distinctive patterns of juvenile offending (i.e., stable offenders, late-onsetters, and desisters), there were divergent and
distinct patterns within their relationship to changes in levels of self-control. In contrast, the second proposition of the theory (stability hypothesis) was not strongly supported because the presence of individual differences indicate that one’s level of self-control is stable for some individuals but not for others. This study’s findings suggest that low self-control develops in ways other than prior tests of self-control theory have indicated. The finding from this analysis suggests that the levels of self-control can decline throughout the life-course.

Furthermore, this study’s findings indicate that the development of social bonds (e.g., parental attachment) in adolescence may be an important contributor to understanding changes in low self-control for those who desist from crime. In the context of South Korean youth, perhaps social bonds (e.g., especially parental attachment) are important factor to explaining desistence from juvenile delinquency. This analysis, though exploratory in nature, provides a methodological approach to assessing the impact of social control on developmental offending trajectories.
APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.6820 | Fax: 601.266.4377 | www.usm.edu/irb

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 11080101
PROJECT TYPE: Dissertation
RESEARCHER/S: Wanhee Lee
COLLEGE/DIVISION: College of Science & Technology
DEPARTMENT: Criminal Justice
FUNDING AGENCY: N/A
IRB COMMITTEE ACTION: Exempt Approval
PERIOD OF PROJECT APPROVAL: 08/09/2011 to 08/08/2012

[Signature]
Lawrence A. Hosman, Ph.D.
Institutional Review Board Chair

8-10-2011

Date
REFERENCES


