2018

Developmental Patterns of Religiosity in Relation to Criminal Trajectories among Serious Offenders across Adolescence and Young Adulthood

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DEVELOPMENTAL PATTERNS OF RELIGIOSITY IN RELATION TO CRIMINAL TRAJECTORIES AMONG SERIOUS OFFENDERS ACROSS ADOLESCENCE AND YOUNG ADULTHOOD

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in

Criminology and Criminal Justice

College of Arts and Sciences

University of South Carolina

2018

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ACKNOWLEDGEMENTS

This dissertation would not have reached this point without the help, work, and encouragement of many wonderful people. First, I would like to thank my co-chairs, Dr. Robert Brame and Dr. Christi Metcalfe, who are there to guide me at every stage of the dissertation process. I could not have completed my dissertation without their constant support, insights, wisdom, and encouragement. I am deeply indebted to them for all of the effort they have put into my dissertation. I especially want to thank Dr. Christi Metcalfe for her support and guidance during my graduate career. Working with her has made graduate school an educational and growth experience. I also would like to acknowledge my committee members, Dr. Robert Kaminski and Dr. John Hoffmann, for their help and willingness to serve on my dissertation committee. Each member of the committee has dedicated their time to help me refine research ideas and improve my dissertation.

ABSTRACT

The knowledge about the relationship between changes in both religiosity and crime over time remains limited. This dissertation aims to add to the existing body of literature and fill the gaps in prior studies by examining the religiosity-crime relationship in a sample of adjudicated adolescents studied in the Pathways to Desistance Study, a seven-year longitudinal dataset. Using Group-Based Trajectory Models and Growth Curve Models, this dissertation identifies distinctive trajectories of religious attendance, religious importance, and spirituality and their dynamic relationships with changes in different types of substance use and criminal behavior. Given the initial level of substance use and criminal behavior, the results show that offenders with higher religiosity have a lower likelihood of engaging in substance use and criminal behavior than those who are less religious or nonreligious, regardless of dimensions of religiosity. With respect to changes in religiosity, not all trajectory groups of religious attendance, religious importance, and spirituality are significantly associated with each type of substance use and criminal behavior. It is not very clear which dimensions of changing religiosity are more strongly associated with which types of changing crime and deviance. For those significant dynamic relationships, the results generally indicate that gains in religiosity continue to attenuate the risk of substance use and criminal behavior, while losses in religiosity are associated with elevated risk of substance use and criminal behavior. In addition, the findings regarding these relationships are consistent despite the confounding variables controlled. The results

suggest that religiosity may be an important variable in predicting the trajectory of substance use and criminal behavior from adolescence to young adulthood, and may serve as a protective factor assisting serious offenders to desist from crime. Strengthening, emphasizing, and reinforcing different elements of religiosity may increase the chances that religiosity becomes a prosocial turning point in the lives of serious offenders. Religiosity may be an important resource for prevention of drug abuse and criminal behavior, as well as rehabilitation from drug dependence and recidivism.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

According to numerous surveys and public opinion polls, religion plays an important role in the lives of adolescents in the United States (Denton, Pearce, & Smith, 2008; Gallup, 2016; Harris, 2009; Smith, 2005). For instance, the longitudinal survey of the National Study of Youth and Religion (NSYR) in 2005 indicates that almost 78 percent of 3,290 adolescents ages 13-17 in America reported believing in God (Denton, Pearce, & Smith, 2008), and almost half (49-51%) of American adolescents state that religion is important in their daily lives and that religious beliefs produce significant effects on shaping their major life decisions (Smith, 2005). Given the importance of religion to most American adolescents, the investigation of the religion-crime link has been of particular interest to researchers with a large number of studies carried out over the past few centuries. It is expected that religious individuals are less vulnerable to the risk of crime than irreligious counterparts.

Given that "religious experience is inward, subjective, and highly individualized" (Chu, 2007, p.4), it seems extremely difficult to define religiosity. When exploring the role of religiosity in reducing crime, studies focus more on operational rather than theoretical definitions of religiosity. Religiosity, generally operationalized as religious service attendance, perceived importance of religion, and other dimensions of religion of interest

including religious denomination and particular religious beliefs, has been widely used within empirical studies. These studies have identified religiosity as a potentially important factor that protects against an extensive range of criminal behaviors, such as substance use, violence, petty or felony theft, and arrest (Bahr & Hoffmann, 2008; Baier & Wright, 2001; Benda, Pope, & Kelleher, 2006; Ellison, Trinitapoli, Anderson, & Johnson, 2007; Good & Willoughby, 2006; Johnson, Larson, De Li, & Jang, 2000; Sinha, Cnaan, & Gelles, 2007). However, the nature of the relationship remains unclear. Some researchers have maintained that religiosity is inversely related to the level of crime (Baier & Wright, 2001; Cochran, Wood, & Arneklev, 1994; Rodell & Benda, 1999), while others have found that a positive or null relationship exists (Benda & Corwyn, 1997; Cochran et al., 1994; Gannon, 1967; Hirschi & Stark, 1969; Kane & Patterson, 1972). For those studies maintaining a negative association between religiosity and crime, there are inconsistent results regarding whether religiosity directly affects crime or whether the relationship is indirect or spurious (Desmond, Soper, & Kraus, 2011; Desmond, Soper, Purpura, & Smith, 2008; Jang, Bader, & Johnson, 2008; Mason & Windle, 2002).

An overarching concern of existing literature about the religiosity-crime link is that the vast majority of research has relied heavily on cross-sectional designs. Only a relatively small number of studies have used longitudinal data to examine the relationship between religiosity and crime, especially substance use. Some of these longitudinal studies have endeavored to examine the long-term effect of adolescent religiosity on subsequent involvement in and/or dynamics of crime (e.g., abstinence vs. initiation and persistence vs. desistence) (Bakken, Gunter, & Visher, 2013; Chu, 2007; Desmond et al., 2011; Desmond et al., 2008; Giordano, Longmore, Schroeder, & Seffrin, 2008; Jang et al., 2008; Johnson,

Jang, Larson, & De Li, 2001; Mason & Windle, 2002; Ulmer, Desmond, & Johnson, 2010). However, these types of longitudinal studies only treat religiosity as a time-invariant variable, in which constructs used to measure religiosity assess only baseline/current religious involvement and/or beliefs. These measures thus provide little information about the development of religiosity over time, which may limit our understanding of whether changes in religiosity would have distinctive influences on criminal involvement over time.

Individual religiosity is often dynamic and fluid such that religious beliefs, values, salience and practices are developed and reflexively practiced over a lifetime (Atchley, 1999). Previous studies indicate that religious behaviors and attitudes do change, especially as adolescents make the transition to young adulthood (Desmond, Morgan, & Kikuchi, 2010; Uecker, Regnerus, & Vaaler, 2007). During this transitional period, individuals begin to reconsider religious beliefs and values transmitted from their parents and then develop their own value and belief structures on the basis of experiences, backgrounds and interests they possess (Arnett, 2000; Koenig, McGue, & Iacono, 2008). Once they become young adults, they may alter their religious affiliations, decrease religious participation and report that religion is less important (Petts, 2007; Regnerus & Uecker, 2006; Uecker et al., 2007). Thus, only investigating the baseline/current religiosity may overlook the potential influence from the previous or afterward religiosity on deterring crime. For instance, if an individual's high religiosity later decreases, his or her criminal behavior may increase to a point that slightly but consistently surpasses the level of crime of one who is continually low in religiosity. It is therefore possible that a change in religiosity itself may contribute to the level of crime differentially when compared with the absolute level of religiosity.

Given that religiosity is often fluid and can change over an individual's lifetime,

other longitudinal studies have attempted to examine whether and how changes in religiosity relate to subsequent involvement in crime. Acknowledging individual heterogeneity of the development of religiosity, some studies model changes in individual religiosity by subtracting religiosity at Time 1 from that at Time 2 (Charles, Curry, & Chalfant, 1985; Moscati & Mezuk, 2014; Ulmer, Desmond, Jang, & Johnson, 2012), in which adolescents who decrease their level of religiosity demonstrate higher levels of later delinquency than those who have consistently been low in religiosity. Although these studies have recognized the inherent heterogeneity of religious development within individuals, examination of change between only two time points is not enough to capture the real change of religiosity over one's life course. For instance, it is premature to classify individuals who are high at Time 1 and remain stable at Time 2 into a stable high group. It is possible that there are potential variabilities between two time points or this trend may change if individual religiosity is continually observed. This can be resolved by assessing religiosity at multiple time points over an individual's life course.

To date, some researchers have shown interest in evaluating the role of religious changes in predicting trajectories of crime through the use of longitudinal data, in which both changes in religiosity and crime are observed during a relatively longer life time period with multiple time points (Desmond, Kikuchi, & Budd, 2010; Petts, 2009a; Pirutinsky, 2014). These studies have generally indicated that changes in religiosity are significantly related to changes in crime, in which significant decreases in religiosity coincide with increases in criminal behavior, and vice versa.

1.2 STATEMENT OF PROBLEM

Despite the findings discussed above, there is still a rather limited understanding of

the relationship between changes in religiosity and changes in crime over an individual's life course given important gaps observed among the existing studies. Several important limitations in terms of research design, analytical techniques, measurement of religiosity, specific outcomes of crime, investigated sample and confounding variables will be further discussed in this section.

Research Design

The majority of studies regarding the religiosity-crime link have focused on cross-sectional designs, a relatively small number of studies have been conducted within longitudinal designs, and fewer have investigated how changes in religiosity are linked to subsequent outcomes of crime (Bakken et al., 2013; Charles et al., 1985; Desmond, Kikuchi, et al., 2010; Desmond et al., 2008; Mason & Spoth, 2011; Moscati & Mezuk, 2014; Petts, 2009a; Pirutinsky, 2014; Ulmer et al., 2012). Only three studies to date have explicitly examined the relationship between both changes of religiosity and crime during a relatively longer life time period with multiple time points (i.e., Desmond, Kikuchi, et al., 2010; Pirutinsky, 2014; Petts, 2009). It is not surprising how limited our understanding is of how religiosity evolves over time and how this change might impact offenders' criminal trajectories over the life course.

Analytic Techniques

With respect to those studies investigating both changes in religiosity and crime, an overarching concern is the analytic techniques used to model changes of religiosity (i.e., growth curve model: Desmond, Kikuchi, et al., 2010; Pirutinsky, 2014; multinomial logistic regression: Petts, 2009a). These approaches are limited in their focus on a dramatic and overall trend of religious changes (e.g., a significant overall decrease or increase in

religiosity), which often overlooks a great deal of variability in individual-level changes of religiosity that have strongly demonstrated by studies of the development of religiosity (Koenig et al., 2008; Pearce & Denton, 2011; Regnerus & Uecker, 2006; Willits & Crider, 1989). Not all adolescents follow the same pattern of religious growth or decline. For example, the overall trend of religious attendance is decreasing within a given population, however, for some individuals it may increase, remain stable, or exhibit curvilinear change showing distinct trajectories over time. Therefore, identifying more nuanced changes of religiosity through trajectory models would bring greater clarity to the relationship between changes in religiosity over the life course and crime. Trajectory models are beneficial in that they allow for an examination of both small and large changes in religiosity, and provide an illustration of particular pathways of religious development that individuals may experience from early adolescence though young adulthood.

Measurement of Religiosity

Existing longitudinal studies vary considerably in their measurement of religiosity. Some studies assess only one dimension of religiosity (Moscati & Mezuk, 2014 [religious salience, indicated as perceived importance of religion]; Petts, 2009a [religious attendance, defined by frequency of attendance at religious activities]; Pirutinsky, 2014 [spirituality, refers to the extent of individuals' actions are influenced by belief in a God]), which only explains one aspect of religiosity and does not adequately assess the complexity of religiosity. Religiosity is a complex and multidimensional phenomenon that may include multiple aspects, such as frequency of prayer, participation in sample group Bible study in communities, or commitment to religious organizations. Others assess only overall religiosity by creating composite scores of religious attendance and salience as proxies for

religiosity in different ways (e.g., Desmond, Kikuchi, et al., 2010; Jang, Bader, & Johnson, 2008; Jang & Johnson, 2001; Mason & Spoth, 2011; Ulmer et al., 2012), which precludes inferences about individuals' development in each dimension of religiosity. Taken together, it seems difficult for researchers to capture a comprehensive picture of changes in religiosity through the use of a single aspect of or overall religiosity.

Given that religion is a multi-dimensional phenomenon (Hood Jr, Hill, & Spilka, 2009), questions arise about how to best measure individuals' religious beliefs and practices. Although there is still disagreement among researchers about which measures are best, most researchers agree that multiple measures of religiosity are essential to understanding this multifaceted concept (Cornwall, Albrecht, Cunningham, & Pitcher, 1986; Longest & Vaisey, 2008). Screening the existing literature regarding the religiosity-crime link, there are two major approaches to model religiosity. One is to examine dimensions of religiosity in isolation or in combination, and the other is to identify distinctive religious profiles configured by different dimensions of religiosity.

Concerning religious development, although dimensions of religiosity tend to be related, different dimensions of religiosity may follow distinctive developmental trajectories, in which some aspects of religiosity may increase, while others stay the same or continue decreasing over time. For instance, research suggests drops in the frequency of participation in religious activities/services, but stability or increases in private religiosity, such as commitment to religious faiths and belief salience, from adolescence into young adulthood (Arnett & Jensen, 2002; Stoppa & Lefkowitz, 2010). These studies provide insights into the importance of separately examining individual dimensions of religiosity, such as religious attendance, religious salience, or religious beliefs, in modeling changes

in religiosity. With respect to the religiosity-crime link, previous studies have shown that the results are inconsistent in terms of individual dimensions of religiosity (Benda & Corwyn, 1997; Benda et al., 2006; Cretacci, 2003). In some instances only certain dimensions of religiosity are associated with criminal behaviors. For example, religious attendance has a significant effect on offenders' desistance from substance abuse, while religious salience does not (Chu, 2007). Thus, it seems to be wise to examine different aspects of religiosity separately to capture the nuances of change, when investigating its relationship with changes in criminal behavior.

Specificity of Outcomes

Existing literature examining the role of changes in religiosity on dynamics of delinquency and crime has looked at relatively few outcomes. Almost all of them frequently focus on substance abuse and delinquency (Charles et al., 1985; Desmond, Kikuchi, et al., 2010; Mason & Spoth, 2011; Moscati & Mezuk, 2014; Petts, 2009a; Ulmer et al., 2012). In fact, none of these studies have attempted to look at the relationship between changes in religiosity and serious crime. More recent work has attempted to examine this relationship among serious juvenile offenders. Yet this work has also been limited in the operationalization of offending behavior by using an overall measure of self-reported offending with offenses ranging from violent crime to property crime (Pirutinsky, 2014). Criminal acts are diverse and the underlying motivations and reasoning for involvement in crime may vary by type. Previous research has indicated that the relationship between religiosity and crime relies on the types of criminal activities being assessed (Albrecht, Chadwick, & Alcorn, 1977; Benda, 1994; Burkett, 1993; Chu, 2007; Cochran, 1988; Cochran & Akers, 1989; Cochran et al., 1994; Hadaway, Elifson, &

Petersen, 1984; Jang & Johnson, 2001; Stark & Bainbridge, 1987).

Specifically, the research is not consistent regarding the types of offenses that are related to the presence of religiosity. For instance, some researchers have argued that religiosity has a stronger effect on anti-ascetic or victimless behaviors that explicitly violate religious or denominational traditions, such as substance abuse (Burkett & White, 1974; Cochran & Akers, 1989), while others do not and suggest religiosity is also significantly associated with a wide variety of delinquent behaviors (Baier & Wright, 2001; Benda, 1995; Cochran, 1988; Johnson, Li, Larson, & McCullough, 2000). With respect to the religiosity-crime relationship over time, it is possible that this relationship is only relevant for certain types of crime; therefore, it would be useful to determine how exactly changes in religiosity relate to changes in crime among multiple offense categories. However, there has been no attempt to determine whether change in religiosity over an offender's life course is more important in the inhibition of certain types of serious offenses, such as violent crime, compared to other types of offending such as property crime or substance use.

Adjudicated Sample

Our understanding of the religiosity-crime link has mostly come from research conducted on conventional adolescent samples, which is limited in its generalizability to more serious offenders. Given their more extensive involvement in crime, serious juvenile offenders who are placed in unique contextual and social milieus may be more likely to have lower levels of religiosity than other conventional adolescents. Investigating a sample of serious juvenile offenders allows us to test whether differential patterns exist in the religiosity-crime relationship, especially whether or not religiosity operates differentially

to help offenders stay away from crime over the life course. Thus, in order to fill this gap in the literature, it is important to examine the role of religiosity among more serious adolescent offenders to develop a better understanding of how changes in religiosity relate to changes in crime over the transitional time period from adolescence to young adulthood.

Confounding Variables

There is still much debate about whether or not the association between religiosity and adolescent crime is spurious. It has been found that the relationship between religiosity and crime decreases or becomes insignificant after accounting for important confounding variables, such as peer, family, and school influences (Burkett & Warren, 1987; Cochran et al., 1994; Desmond et al., 2008; Elifson, Petersen, & Hadaway, 1983; Marcos & Bahr, 1988; Mason & Windle, 2002). Including relevant control variables in research is essential to resolve this debate. However, much of the research—both cross-sectional and longitudinal—has failed to account for a variety of variables that may confound this relationship. Without controlling for relevant confounding variables, it is difficult for researchers to make a convincing conclusion that the inverse relationship between religiosity and crime is never spurious. In order to expand the current research, studies should further assess the religiosity-crime link by controlling for factors that may influence the relationship. Theories that may explain the religiosity-crime link can point to important variables that need to be included in research to clarify the relationship.

1.3 CURRENT RESEARCH AIMS

The knowledge of the relationship between changes in both religiosity and crime over time remains limited. This dissertation is to add to the existing body of literature on this relationship and fill the gaps in prior studies through a number of important ways. First,

religious studies have demonstrated that there is a great deal of heterogeneity in the development of religiosity within individuals. However, only three criminological studies acknowledge this and explicitly investigate the relationship between religious changes and criminal behavior by identifying distinct groups of change in religiosity within two time points. To my knowledge, no studies have explicitly identified whether and how distinctive trajectories of religiosity relate to changes in crime over a relatively longer period of time with multiple time points. Hence, the dissertation aims at extending the body of knowledge about whether and how changes in religiosity relate to changes in criminal behavior by identifying subgroups of individuals who follow distinctive trajectories of religiosity over a long period of time.

Second, a review of the existing literature indicates that using a single aspect of religiosity or overall religiosity does not capture an inclusive picture of changes in religiosity. In order to address this gap, this dissertation models changes in religiosity through the use of a more holistic approach. As mentioned above, to better capture the true relationship between religiosity and crime, it is important to study various dimensions of religiosity separately. Therefore, modeling distinctive trajectories for each dimension of religiosity will be beneficial to get a better understanding of changes in religiosity and their relationships with criminal trajectories.

Third, there is not as much attention devoted to examining the religiosity-crime link over time among serious juvenile offenders. Far less is known about how changes in religiosity relate to changes in serious crime over an offender's life course, especially during the transition to early adulthood. Therefore, the dissertation will specifically focus on those serious juvenile offenders and the transition from adolescence into early

adulthood, the time period in which changes of religiosity and crime are most likely to occur. Fourth, extant literature examining the effects of religiosity on criminal behavior has been limited in types of criminal behaviors examined. This dissertation emphasizes the role of religiosity on crime across multiple measures of crime. Finally, this dissertation aims to test whether the longitudinal association between religiosity and crime varies after accounting for control variables that may confound the religiosity-crime link over an offender's life course.

To this end, this dissertation examines the religiosity-crime relationship in a sample of adjudicated adolescents aged 14-18 through the use of the Pathways to Desistance Study, a seven-year longitudinal dataset, paying close attention to the individual heterogeneity in the developmental course of religiosity and its relationship with criminal behavior over time. To be more specific, changes in religiosity are modeled by examining different aspects of religiosity separately to capture the nuances of change. There are only three dimensions of religiosity—religious attendance, religious importance, and spirituality—available in the Pathways to Desistance Study. Therefore, a series of trajectory models are estimated for these three dimensions respectively to identify distinctive developmental trajectories throughout adolescence and young adulthood. In addition, multiple measures of crime, such as official arrest, self-reported total offending, aggressive offending, income offending, and four types of substance use are employed to study changes in crime. After identifying distinctive trajectories of religious attendance, religious importance and spirituality separately, their relationships with changes in crime are further explored to determine if this relationship varies across different types of criminal behavior after accounting for important confounding variables.

This dissertation is exploratory in nature, aiming to answer the following research questions:

1. Are distinct trajectories of each dimension of religiosity (i.e., religious attendance, religious importance, and spirituality) related to changes in offending among serious offenders transitioning from adolescence into early adulthood? If so, how?
2. Does this relationship depend on the measures of criminal behavior?
3. Does this relationship vary after accounting for important confounding variables?

CHAPTER 2

LITERATURE REVIEW

2.1 RELIGIOSITY

Given that "religious experience is inward, subjective, and highly individualized" (Chu, 2007, p.4), it seems extremely difficult to define religiosity. Although much effort has been made to comprehensively designate and measure the concept of religiosity, there is still some debate regarding which of the measures and their accompanying operational definitions is best. Despite this, religiosity is often considered as "those spiritual thoughts, feelings, and behaviors that are specifically related to a formally organized and identifiable religion" (Pargament & Saunders, 2007, p.904). It is widely recognized that religiosity is a complex phenomenon, multidimensional concept (Cornwall et al., 1986; Hill et al., 2000; Pearce et al., 2013), consisting of cognitive, affective, and behavioral dimensions (Cornwall et al., 1986; Pearce et al., 2013). The cognitive dimension of religiosity reflects religious beliefs, such as belief in God, belief in an afterlife, belief in otherworldly beings, and so on; the affective dimension embodies the emotional connection between individuals and sacred or religious matters (e.g., feeling closeness to God, religious salience); and the behavioral dimension reflects practice, such as attendance at religious services, participation in religious groups/activities, prayer, and reading scripture (Cornwall et al., 1986; McGuire, 2008; Pearce et al., 2013; Stark & Glock, 1968). In addition, two broad

dimensions of religiosity have been primarily applied: first, a dimension called organizational/objective/public religiosity, which represents public or organizational religious behaviors, such as attending church or participation in religious organizations; and second, a dimension termed intrinsic/subjective/private religiosity, which indexes the perceived importance of religiosity, religious beliefs, or emotional connection to God (Moscati & Mezuk, 2014; Salas-Wright, Vaughn, Maynard, Clark, & Snyder, 2014).

2.2 RELIGIOSITY AND CRIME

With respect to studies investigating the religiosity-crime relationship, two major approaches have been primarily used to model religiosity. The approaches are to examine dimensions of religiosity in isolation or in combination. To be more specific, some studies have investigated individual components of religiosity separately, such as attendance at religious services, participation in religious activities, private religious practices like prayer, salience of religious faiths, and influence of religious beliefs on decision making or behavior (Allen & Sandhu, 1967; Laird, Marks, & Marrero, 2011; Salas-Wright, Vaughn, Maynard, et al., 2014). Others have summed or averaged a variety of elements of religiosity into a singular composite measure (Desmond et al., 2011; Desmond et al., 2008; Jang & Johnson, 2001).

Cross-Sectional Studies

A large body of cross-sectional studies has been conducted to investigate the relationship between religiosity and crime in adolescence, in which religiosity is measured by different dimensions of religiosity in isolation or in combination. The evidence supporting the claim that religiosity and crime are related, however, has indicated mixed results. For instance, Hirschi and Stark (1969) assumed that religious attendance and

beliefs in an eternal sanction system afterlife would be related to lower levels of delinquent involvement. But inconsistent with this hypothesis, juvenile delinquency was unaffected directly or indirectly by religious involvement and beliefs. After a series of studies over a decade, it was still debated whether or not religiosity helped reduce delinquency. Some studies indicated that religiosity does inhibit an extensive range of delinquent and criminal behavior (Allen & Sandhu, 1967; Evans, Cullen, Dunaway, & Burton, 1995; Higgins & Albrecht, 1977; Jensen & Erickson, 1979; Rohrbaugh & Jessor, 1975). Others, however, supported the null hypothesis and found minimal or no differences in committing offenses between religious and nonreligious adolescents (Bahr, Hawks, & Wang, 1993; Benda & Corwyn, 1997; Cochran et al., 1994; Ellis, 1987; Ellis & Thompson, 1989; Evans et al., 1996; Kandel, Treiman, Faust, & Single, 1976; Krohn, Akers, Radosevich, & Lanza-Kaduce, 1982; Marcos & Bahr, 1988; Marcos, Bahr, & Johnson, 1986).

The discrepancy of these findings in the religiosity and crime literature may be attributable to multiple ways in which religiosity and crime have been measured. Although some studies use a composite religiosity scale to assess overall religiosity (e.g., Bahr & Hoffmann, 2008), research into the relationship between religiosity and crime indicates a non-negligible nuance observed within individual components of religiosity. Actually, the results from some research have demonstrated that only one dimension of religiosity—sometimes subjective/private, sometimes objective/public (e.g., religious attendance vs. religious importance and/or religious beliefs)—serves as a protective factor against particular expressions of adolescent delinquency and crime (Allen & Sandhu, 1967; Laird et al., 2011; Nonnemaker, McNeely, & Blum, 2003; Salas-Wright, Vaughn, Maynard, et al., 2014; Smith & Faris, 2002).

For example, Allen and Sandhu (1967) failed to find a significant relationship between religious affiliation, as well as church attendance, and delinquency. However, they did find a significant difference in the strength of religious feelings between delinquent and non-delinquent boys. Similarly, Laird and colleagues (2011) found that religious salience, but not religious attendance, was associated with lower levels of antisocial behavior among adolescents. In addition, private religiosity was directly linked to lower levels of adolescent substance use (Nonnemaker, McNeely, & Blum, 2003; Salas-Wright, Vaughn, Maynard, et al., 2014), while public religiosity had no direct association with adolescent substance use (Salas-Wright, Vaughn, Maynard, et al., 2014). Yet, other studies have found that certain dimensions of religiosity produce greater impacts on delinquency and crime than other dimensions. For instance, church attendance has a greater influence on delinquency than measures of religious attitudes and beliefs (Evans et al., 1995; Tittle & Welch, 1983).

Because there is evidence that certain dimensions of religiosity interact differently with criminal outcomes, a composite measure is not the ideal way of assessing the religiosity-crime link. On the contrary, a comparison of individual components of religiosity can parse disparate relationships between religiosity and crime, and help to resolve discrepant findings. The measurement debate regarding religiosity is likely to persist for some time. For now, the wisest measurement strategy seems to investigate the religiosity-crime link through the use of multidimensional measures of religiosity to reinforce confidence in the existing findings.

The relationship of religiosity and crime is also dependent on the forms of criminal behaviors that adolescents actually engage in, or stated differently, the relationship exists only for certain types of crime. A number of studies indicate that behaviors which disobey

ascetic principles, such as substance use and status offenses, are more strongly related to religiosity than more serious forms of delinquency or even crime, such as assault and property offenses (Benda, 1995; Cochran, 1988; Cochran & Akers, 1989; Cochran et al., 1994; Jensen & Erickson, 1979; McLuckie, Zahn, & Wilson, 1975; Rodell & Benda, 1999; Rohrbaugh & Jessor, 1975; Welch, Tittle, & Petee, 1991). For example, Rodell and Benda (1999) have found that religiosity is associated with the decreased level of alcohol use but has little effect on crime. Still studies maintain that religiosity has a stronger relationship to victimless delinquent activities than to crimes against people or property (Albrecht et al., 1977; Burkett & White 1974; Elifson, Peterson, & Hadaway, 1983). Nevertheless, some studies have found that either drug use is not reduced due to the presence of religiosity or only certain types of drug use are reduced (Bahr & Hoffmann, 2008; Benda, 1994; Benda & Corwyn, 2001; Cochran et al., 1994). Bahr and Hoffmann (2008), for instance, found that individual religiosity was strongly associated with reduced levels of cigarettes smoking, heavy drinking, and marijuana use but not the use of other illicit drugs. Despite these, other studies have indeed demonstrated that religiosity is significantly associated with a wide variety of delinquent behaviors, not just victimless offenses (Baier & Wright, 2001; Higgins & Albrecht, 1977; Johnson, Li, et al., 2000).

In addition, the findings regarding the religiosity-crime relationship are inconsistent after controlling for important confounding factors. Some studies have found that religiosity decreases juvenile delinquency even after controlling for factors including peer and family relationships, moral beliefs, and sociodemographic status (Albrecht et al., 1977; Bahr & Hoffmann, 2008; Benda & Corwyn, 2001; Chadwick & Top, 1993). However, others found that the relationship between religiosity and crime became negligible after

relevant characteristics were controlled (Bahr et al., 1993; Cochran et al., 1994; Ellis, 1987; Ellis & Thompson, 1989; Kandel et al., 1976; Marcos & Bahr, 1988; Marcos et al., 1986). For instance, Elifson, Peterson, and Hadaway (1983) found that the religiosity-crime relationship became insignificant after familial and peer relationships were controlled in multivariate analyses. Similarly, the study of Bahr, Hawks, and Wang (1993) showed that religious importance was no longer significantly related to adolescent delinquent behaviors (i.e., marijuana and cocaine use) after relevant social control variables (e.g., parental monitoring, family drug use, and family cohesion) were included. In addition, Cochran, Wood, and Arneklev (1994) confirmed the spuriousness of the religiosity-delinquency link, such that the observed relationship between religiosity and delinquent behaviors, particularly on assault, vandalism, illicit drug use and truancy, became insignificant when both social control and arousal variables were controlled for in the analysis.

In general, this brief review of the cross-sectional literature suggests that there is a lack of consistent results regarding the religiosity-crime link, with some studies finding a strong negative relationship and others none at all. However, a few empirical studies shed light on the longitudinal effects of religiosity on crime. The following section provides a comprehensive review of longitudinal studies concerning the relationship between religiosity and dynamics of crime, in terms of various dimensions of religiosity.

Longitudinal Studies

Although our knowledge of the association between religiosity and crime has been significantly advanced in recent years, there are still some important gaps to fill. A predominant concern is that the majority of research on religiosity and crime has relied heavily on cross-sectional designs. Although using cross-sectional data is appropriate and

informative for certain research questions, it is limited in its ability to investigate the long-term effect of religiosity on subsequent involvement in and/or dynamics of crime, as well as the development of religiosity and its relationship with changes in crime over the life course. Longitudinal studies, by contrast, allow for these investigations, which could provide a better understanding of the relationship between religiosity and crime over time.

A growing number of studies have been conducted to examine the long-term effect of religiosity on subsequent crime using longitudinal data. Building upon theoretical contexts, these studies investigate the mechanisms through which religiosity affects subsequent involvement in crime. However, the research findings are inconsistent on whether and how religiosity affects delinquency. Some studies have found that religiosity reduces the likelihood of subsequent delinquency even after controlling for important relevant variables, such as peer influence, family relationships, moral beliefs, and sociodemographic characteristics (Desmond et al., 2011; Desmond et al., 2008; Jang et al., 2008; Johnson et al., 2001; Mason & Windle, 2002). Others, however, have demonstrated that the inhibitory effect of religiosity on subsequent crime is indirect (Burkett & Ward, 1993; Burkett & Warren, 1987; Desmond et al., 2011; Jang et al., 2008) or spurious (Desmond et al., 2008; Mason & Windle, 2002).

The reasons for mixed results are multifold and include, but are not limited to, the operationalization of religiosity (religious attendance vs. religious beliefs), the discussion of specific criminal behaviors for which this relationship holds, and the control of relevant theoretical constructs. For instance, using two-wave longitudinal data with a 1-year interval, Mason and Windle (2002) examined the longitudinal effect of religiosity on alcohol use among youth during mid-adolescence. The results of longitudinal analyses

indicated that religious importance had a negative association with later decisions to use alcohol, but this relationship disappeared after accounting for the influences of peers, family, and school. Similarly, although attendance at religious services was moderately and negatively related to subsequent alcohol problems, this association became negligible after estimating more fully specified models. By contrast, attendance at religious services was related to subsequent decreases in the quantity and frequency of alcohol use even taking into account the influences of peers, family, and school.

In addition, using data from the National Youth Survey, Desmond and his colleagues (2009) have found that religiosity does not have a significant negative effect on later hitting and property offenses, regardless of whether the variable of moral beliefs is included, while there is a significant negative effect of religiosity on later marijuana use and excessive alcohol use. Interestingly, religiosity produces a stronger influence on later marijuana and alcohol use when it is accompanied by strong moral beliefs (i.e., when these behaviors are considered as morally wrong by adolescents). Using similar data, Desmond and his colleagues (2011) assessed the interaction of peer influences and religiosity on substance use and other forms of delinquency. They found that religiosity had no significant negative effects on later hitting and property offenses no matter if interaction terms between religiosity and peer variables were included. In contrast, religiosity can work as a protective factor lessening peer influences, even when religious adolescents are exposed to delinquent peers who encourage substance use (i.e., marijuana use and alcohol use).

In addition to investigating the long-term effect of religiosity on subsequent crime, studies have also been conducted to explore how religiosity impacts the dynamics of crime

(i.e., abstinence vs. initiation and persistence vs. desistence). Religiosity may reinforce and sustain one's decision to abstain or desist from crime, if adolescents do become initially involved. Only a handful of longitudinal studies explicitly investigate the effects of religiosity (or spirituality) on initiation and desistance. Some of these studies found that religious involvement did protect adolescents from initiating marijuana use, but did not significantly predict desistance from marijuana use (Ulmer et al., 2012; Ulmer et al., 2010). In addition, no significant effect of offenders' religiosity on long-term desistance from crime was found in the quantitative analyses of Giordano et al. (2008).

Other studies, however, demonstrated that religiosity did encourage desistance from crime. Among the qualitative narratives of Giordano et al. (2008), both church attendance and spirituality were considered as a potential "hook" (e.g., a source of prosocial capital, positive emotional coping and ties to prosocial others) for a life-course change away from crime. Similarly, using qualitative interview data, Schroeder and Frana (2009) indicated that increases in religious involvement might also encourage desistance. This effect did depend on dimensions of religiosity. Chu (2007) has indicated that frequent attendance at church service is significantly related to desistence from marijuana and other drug use, but religious salience is only negatively associated with the initiation of drug use. In addition, Bakken, Gunter, and Visher (2013) found that it was the spirituality rather than religious affiliation that had a significant impact on offenders' desistance from substance use, particularly from both alcohol and cocaine use, during reentry. Investigating the mechanisms through which one's religiosity contributed to sustained behavioral change, including desistance from crime, Schroeder and Frana (2009) further indicated that individuals who were undergoing behavioral change generally used religiosity as an

emotion-coping mechanism to deal with emotional discomfort (e.g., anger or anxiety), to distract from current stressors (i.e., adverse life conditions), and to transfer from a deviant life to a more conventional one.

The aforementioned studies are non-developmental assuming that religious involvement and/or beliefs will not change over time, in which only baseline/current religiosity is used to explore the effect of religiosity on the dynamics of delinquency/crime. These studies may be misguided since religiosity is not always stagnate over one's life course. It is a dynamic variable that will develop and change with increased age and changing social contexts and individual characteristics (Atchley, 1999; Chan, Tsai, & Fuligni, 2015). Thus, little is known about whether and how changes in religiosity are linked to delinquent and criminal involvement over time.

Theoretical and empirical literature about religiosity has long emphasized that religiosity can grow, stagnate, and decline over one's life course (Fowler & Dell, 2006; Hagberg & Guelich, 1989). Given religion is an important part of life for many adolescents and young adults, understanding adolescent religious trajectories or when adolescents experience religious change may advance our knowledge about adolescent developmental outcomes, such as behavioral problems. Previous research investigating the development of religiosity has indicated that emerging adulthood is a critical transitionary period for the formation of religious beliefs, values, and attitudes (Arnett, 2000, 2014; Arnett & Jensen, 2002; Barry, Nelson, Davarya, & Urry, 2010; Smith & Snell, 2009). Emerging adulthood is a period that often involves rapidly changing social contexts, important life-events, and evolving identity (Arnett, 2000). Given the particular contexts, the transitional period may also play an important role in developmental changes of religiosity, "serving as a catalyst

for exploration or renegotiation of individuals' religious identity and participation habits from adolescence" (Chan, Tsai, & Fuligni, 2015, p. 1557). As adolescents enter young adulthood, they may begin to reconsider religious beliefs and values transmitted from their parents and then develop their own value and belief structures on the basis of experiences, backgrounds, and interests they possess (Arnett, 2000; Koenig et al., 2008). Once they become young adults, they may alter their religious affiliations, decrease religious participation, and report that religion is less important because of increasing autonomy and independence achieved during this period (Petts, 2007; Regnerus & Uecker, 2006; Uecker et al., 2007).

Studies in recent decades have started to illuminate changes in religiosity over one's life course, and their findings show a general average decrease in a variety of aspects of religiosity during this transitionary time period (Desmond, Morgan, et al., 2010; Koenig et al., 2008; Pearce & Denton, 2011; Uecker et al., 2007). In addition, to capture the mean-level decreases of religiosity, it is also important to explore the individual-level changes for a better understanding of the development of religiosity. Actually, there is a great deal of inherent heterogeneity in the development of religiosity within individuals. Some may decline over time while others may increase or remain stable (Koenig et al., 2008; McCullough, Enders, Brion, & Jain, 2005; Pearce & Denton, 2011; Petts, 2009b; Regnerus & Uecker, 2006). That is, people's religiosity shows distinctive patterns of trajectories over the life course, even if their religiosity suggests a general decreasing trend.

Prior studies have also identified that the changes observed over time partially rely on which components of religiosity are being measured. Most of these studies focus on the comparison of two major components of religiosity: public religiosity and private

religiosity. Specifically, some researchers have indicated that while both frequency of attendance at religious services and salience of religion decrease in adolescence and emerging adulthood, religious attendance decreases more than religious salience (Desmond, Morgan, et al., 2010; Koenig et al., 2008; Pearce & Denton, 2011; Smith & Snell, 2009; Uecker et al., 2007). Desmond and his colleagues (2010), for instance, suggested that although people's attendance at religious services and belief in the importance of religion decreased from adolescence to early adulthood, the decrease was greater for religious service attendance. Other studies regarding changes over time in private religiosity (e.g., religious importance and/or religious beliefs), however, indicated that private religiosity was relatively stable throughout adolescence (Kerestes, Youniss, & Metz, 2004; Willits & Crider, 1989).

In addition, acknowledging the inherent heterogeneity of religiosity within individuals, a few studies identified individual developmental trajectories of different dimensions of religiosity based on whether they increase, decrease, or remain stable. For example, using growth mixture modeling, McCullough and his colleagues (2005) identified three distinct trajectories of religious commitment in a sample of North American adults (ages 27 to 80 years): (1) increasing levels of commitment until midlife and a decrease with older age (a parabolic curve), (2) early low levels of commitment which declined with age, and (3) high level of commitment in early adulthood which increased with age. Using a latent class growth analysis/group-based trajectories analysis, Petts (2009b) investigated North American youth (aged 10 to 25 years) and found six distinct trajectories for religious attendance: (1) high stable attendance, (2) occasional stable attendance, (3) low stable attendance, (4) decrease early in adolescence, (5) decrease late

in adolescence, and (6) decrease gradually over time. However, these studies only use one of the dimensions of religiosity (e.g., religious participation), which provides little information about trajectories of other religious dimensions that may be distinct.

Given that religiosity does change over time, it is therefore possible that a change in religiosity itself may play a different role in influencing criminal involvement when compared with the absolute level of religiosity. For instance, the exclusive focus on consequences of the baseline/current low religiosity ignores deviance-amplification effects of the previous high religiosity (Charles et al., 1985). Among adolescents whose high religiosity later decreases, delinquent behavior may increase beyond the level expected by simply the cessation of religious deterrence (i.e., continually low in religiosity). A handful of studies have been conducted to investigate whether and how changes in religiosity are associated with distal/subsequent crime, as well as changes in criminal behaviors (Charles et al., 1985; Desmond, Kikuchi, et al., 2010; Mason & Spoth, 2011; Moscati & Mezuk, 2014; Petts, 2009a; Pirutinsky, 2014; Ulmer et al., 2012).

Acknowledging individual heterogeneity of religiosity within individuals, some studies investigated how changes in religiosity were related to the dynamics of crime by identifying distinctive groups of religiosity, in which a change in religiosity was calculated by subtracting religiosity at Time 2 from that at Time 1 (Charles et al., 1985; Moscati & Mezuk, 2014; Ulmer et al., 2012). To be more specific, using data from the Youth in Transition study, Charles, Curry and Chalfant (1985) investigated the relationship of religiosity (a composite mean score of items relating to devotionalism, congregational involvement and salience) and delinquency over time by testing both "deviance deterrence" and "deviance amplification". In this study, four groups of adolescents were identified by

subtracting religiosity in 1966 from that in 1968: those whose religiosity remained high, those whose religiosity changed from high to low, those whose religiosity was continually low, and those whose religiosity increased from low to high. They found that among adolescents with unchanging high religiosity, their religiosity continued to inhibit delinquent behavior. Delinquency was also reduced among adolescents whose religiosity increased. In addition, adolescents who decreased their religiosity over time demonstrated higher levels of delinquency than those adolescents who had consistently been low in religiosity. Charles, Curry and Chalfant (1985) suggest that it is exactly because high religiosity inhibits delinquency at an earlier time point and delinquency tends to be magnified when this religiosity later decreases. Those adolescents who remained high in religiosity or those who became more religious demonstrated lower rates of delinquency.

Using data from the National Comorbidity Study Replication, Moscati and Mezuk (2014) investigated how changes in intrinsic religiosity from childhood to adulthood were related to both recent and lifetime substance abuse/dependence of alcohol, tobacco, and illicit drugs. Changes in religiosity were calculated by subtracting intrinsic religiosity in adulthood from that in childhood, such that a positive change score indicates an increase in religiosity in adulthood relative to childhood. Four categories of lifetime religiosity were identified: (1) consistently low in childhood and adulthood, (2) consistently high in childhood and adulthood, (3) high in childhood but low in adulthood, and (4) low in childhood but high in adulthood. The results showed that individuals in the consistently low group were more likely to begin drinking early, have been a smoker, and to have met criteria for nicotine dependence relative to those in the more moderate lifetime religiosity groups. Individuals in the consistently high group, conversely, were buffered from most

substance use outcomes. Although the high-then-low group has suggestive results of increased risk and the low-then-high group's results may imply a slight protection, none of the results reach significance due to the small size of the group.

Additionally, Ulmer and his colleagues (2012) investigated the association between changes in religious involvement (a composite sum score of religious attendance, religious importance, and prayer) and later patterns of marijuana use through the use of two waves of data from the National Longitudinal Study of Adolescent Health. Changes in adolescent religious involvement were calculated by subtracting religiosity at Wave 3 to that at Wave 1 in which three groups were identified: no change, increase, and decrease. They found that adolescents whose religious involvement declined over time were significantly more likely to experience an increase in their frequency of marijuana use, in comparison with adolescents whose religious involvement stayed the same over time. Nevertheless, an increase in religious involvement did not have a significant impact on changes in marijuana-use frequency. Taken together, it seemed that decreasing religious involvement contributed to increased risk of marijuana use, yet an increase in religious involvement had no influence on marijuana-use frequency.

Although these studies have acknowledged the heterogeneity of religiosity within individuals, the relationship between change in religiosity and crime could not be established definitively because of several observed limitations. In general, these studies have only relied on the investigation of a two time-point change of religiosity. It is difficult to capture the real change of religiosity over one's life course based on two time points, since it cannot guarantee that individual religiosity will not change between or after the two observed time points. Additionally, these studies did not investigate the role of changes

in religiosity in predicting changes in delinquency and substance use. One particular limitation found for the study of Moscati and Mezuk (2014) was that religiosity was not asked about at a particular age (rather a particular developmental period). Therefore, it's possible that initiation of a substance or a substance disorder onset occurs before, after, or even during the transition of religiosity level. To address limitations discussed above, it seems necessary to use longitudinal data that follows individuals from childhood, assessing religiosity and crime at multiple time points, in future studies.

Addressing some of these gaps, some researchers have started to investigate the relationship between religiosity and crime during a relatively longer life time period with multiple time points (Desmond, Kikuchi, et al., 2010; Mason & Spoth, 2011; Petts, 2009a; Pirutinsky, 2014). Using a longitudinal data collected via self-report surveys at 6 time points across 7 years, Mason and Spoth (2011) explored how changes in religiosity in terms of the perceived importance of religion and the frequency of attending religious services related to late adolescent substance use in growth curve models. The results showed both religious attendance and salience declined with age and the rate of change in these two dimensions over the seven years were related inversely to late adolescent substance use. These results suggest the importance of exploring adolescent religiosity from a dynamic, developmental perspective (Benson, Roehlkepartain, & Rude, 2003). However, this study only investigates the rate of change in religiosity and the distal outcome of substance use; little is known about how this change predicts trajectories of substance use and other forms of delinquency and crime.

Using growth curve models, other researchers have attempted to investigate whether and how changes in religiosity relate to changes in delinquency and crime through

the use of multi-wave longitudinal data (Desmond, Kikuchi, et al., 2010; Pirutinsky, 2014). To be more specific, using five waves of the National Youth Survey, Desmond and his colleagues (2010) have examined whether changes in religiosity (a composite score of religious attendance and salience) are related to changes in marijuana use. They found that religious adolescents used marijuana less often initially and exhibited smaller increases in marijuana use over time than nonreligious adolescents. Yet, adolescents with high levels of religiosity were unlikely to experience an increase in marijuana use over time. Furthermore, when religiosity changed over time, only changes in religiosity rather than the initial level of religiosity significantly predicted changes in marijuana use. Such association remained even after controlling variables such as delinquent peer, parental attachment, and moral beliefs. Finally, they indicated that when adolescent religiosity increased, marijuana use tended to decrease, and vice versa. In addition, using longitudinal data from the Pathways to Desistance Study, Pirutinsky (2014) attempted to thoroughly investigate causal relationships between spirituality, self-control, and crime within multilevel growth curve models. They found that increased spirituality might cause reduced future offending, and this effect was partially mediated by increased self-control.

Using multinomial logistic regression models, Petts (2009a) has investigated how religious characteristics and changes in religious attendance are related to distinctive trajectories of delinquency identified by group-based trajectory modeling from early adolescence through young adulthood. He found that changes in religious attendance were to some extent associated with individual trajectories of delinquency over time based on the data from the National Longitudinal Survey of Youth 1979. He further suggested that an increase in religious attendance might result in greater social support and control, which

was related to lower levels of delinquent behavior for adolescents who followed the trajectory of late adolescent-limited delinquency (Petts, 2009a). In addition, results suggested that religiosity might influence the role of family in delinquent trajectories among adolescents. To be more specific, religiosity might strengthen the influence of parental affection in inhibiting delinquency and alleviate an increased risk of involvement in delinquency among adolescents in single-parent families.

Overall, these criminological studies (Desmond, Kikuchi, et al., 2010; Mason & Spoth, 2011; Petts, 2009a; Pirutinsky, 2014) indicate a general pattern of decrease in religiosity during adolescence and early adulthood and explore how such kind of change in religiosity is related to delinquency or crime over time. However, they overlook individual heterogeneity in the development of religiosity, that is, subgroups of individuals that may have distinct patterns of religious changes. Individuals within a given population do not always follow the same general pattern of religious development, they may increase, decrease, or remain stable over their life course. Studies show that there are distinctive trajectories of religiosity over the life course within individuals even if the general trend of religious development is decreasing (McCullough et al., 2005). Thus, ignoring individual heterogeneity of religious development, these studies may not capture the true relationship between religiosity and crime over time even if changes in religiosity are examined in a longer lifespan with multiple time points.

2.3 THEORIES OF RELIGIOSITY AND CRIME

Theories of social control, self-control, life-course, social learning, and general strain, and various combinations of these perspectives have already been used to explain the religiosity-crime link by identifying various theoretical mechanisms whereby

religiosity reduces the likelihood of offending. These theoretical perspectives suggest that religious individuals are less likely to be offenders than less- or non-religious counterparts, since that they are more prone to: (1) be strongly bonded to conventional society and adopt conventional beliefs and values reinforced by religious commitment and beliefs (i.e., social control); (2) practice and develop high self-control to regulate impulsive behaviors in accord with moral direction emphasized by religiosity (i.e., self-control); (3) be strongly bonded to religious institutions or personal religious beliefs that work as turning points to keep them from future recidivism and shorten their criminal careers (i.e., life-courses); (4) closely associate with peers who share common conventional definitions and behaviors and develop a more favorable identity through positive reinforcement to replace antisocial ones (i.e., social learning); and (5) use positive social and coping skills provided by religiosity that assist in reducing/overcoming individuals' strain, stress and then negative emotions in a legitimate, non-delinquent manner (i.e., general strain).

Religiosity likely entails complex processes of socialization and identity formation, and their effects on youth problem behavior may or may not be reducible to the effects of social bonds, self-control, noticeable life events, peer influence, or coping strategies addressing strain. These relevant theories point to important variables that may be related to both religiosity and crime, which need to be included in research to get a better understanding of the religiosity-crime link. Although this dissertation is not for theory testing, considering these theoretical variables may also provide relevant explanations for potential differences in the risk of criminal involvement across distinctive trajectory groups of religiosity.

Social Control Theory

Social control theory argues the strength of one's attachment, commitment, involvement, and moral belief discourages deviant behavior (Hirschi, 1969). Based on the logic of Hirschi's (1969) theory, it is expected that adolescent religiosity likely fosters prosocial bonds to family, school, and community, as well as inculcates moral beliefs favoring prosocial behavior, all of which can prevent delinquency (Benda & Corwyn, 1997; Cochran et al., 1994; Petts, 2009a). When discussing elements of the social bond, Hirschi (1969) emphasizes the family and school. Although Hirschi does not explicitly include religion in his theory, religion can be considered as one of the conventional social institutions that keeps individuals from delinquency and crime. Scholars also argue that religiosity is an additional element of the social bond that can influence both initiation into and desistance from delinquency and substance use (Adamczyk & Palmer, 2008; Chu, 2007; Longest & Vaisey, 2008), though the influences on onset may not be the same as those on desistance. In addition, the elements of the social bond may be influenced by religiosity.

Specifically, adolescent religiosity is significantly related to high quality of parental/family attachments (Mahoney et al., 2003; Regnerus & Burdette, 2006; Smith & Denton, 2009). As religiosity is enhanced, the quality of the parent-child relationship increases, while delinquency declines. Commitment may be enhanced or reinforced by religious institutions, which often foster a meaning in life that may make delinquency more unattractive. Involvement in religious activities, including church and other religious organizations, absorbs time that may otherwise be used for participation in delinquency. That is, the reason delinquency is less likely for religious adolescents is that religious

commitment and involvement (1) provide them with a sense of belonging and a devotion to reasonable and legitimate aims, (2) contribute to their embeddedness in religion-based networks that get more exposure to religious proscriptions and positive reinforcement against delinquency, as well as (3) leave less time for them to be involved in delinquency (e.g., Adamczyk & Palmer, 2008; Bahr, Hawks, & Wang, 1993; Burkett & Warren, 1987). Finally, religiosity can protect adolescents from engaging in delinquent and criminal behaviors through the socialization of conventional moral beliefs (Burkett & Ward, 1993; Desmond et al., 2008; Johnson et al., 2001; Simons, Simons, & Conger, 2004). Thus, religious bonding or attachment tends to foster and reinforce commitment to and beliefs in conventional values and norms that can prevent adolescents from delinquency and crime.

Self-Control Theory

Gottfredson and Hirschi (1990) propose a general theory to explain individual differences in the propensity to commit criminal behavior. They argue that when individuals have low self-control, they are more likely to engage in delinquency and crime. Self-control is the capacity that individuals can resist immediate and easy pleasure and is relatively unalterable (Gottfredson & Hirschi, 1990). Some scholars otherwise argue that youth self-control is a dynamic psychological capacity that can be promoted and enhanced over time through deliberate practice (e.g., Baumeister et al., 1998) and by social environmental factors, such as moral beliefs and choices or community characteristics (e.g., Arneklev, Cochran, & Gainey, 1998; Piquero & Bouffard, 2007; Tittle, Ward, & Grasmick, 2004; Wikström & Treiber, 2007). In addition to the influences of parenting practices, religious socialization and exposure to religious activities seem to be potentially important processes by which adolescent self-control can be developed and increased.

Religious traditions generally consist of substantive behavioral proscriptions and normative directives/orders, including responsibility, respect, fairness, honesty, and benevolence, that emphasize the significance of moral behavior and the ability to internally regulate or control one's own behavior, which do serve to develop forms of self-control (Geyer & Baumeister, 2005; Laird, Marks, & Marrero, 2011; McCullough & Willoughby, 2009; Smith, 2005; Vazsonyi & Jenkins, 2010; Walker et al., 2007). Thus, the influence of religiosity on delinquency may be impacted by self-control, if religiosity promotes youth's self-control. A growing body of research focuses on self-control that can constrain an individual's thoughts, attitudes, emotions, and behaviors, as a critical mediator of religiosity's protective effect on a wide range of delinquent and criminal behavior (Desmond, Ulmer, & Bader, 2013; Klanjšek, Vazsonyi, & Trejos-Castillo, 2012; Walker et al., 2007).

Age-Graded Life-Course Theory

In expanding Hirschi's (1969) original concept of the social bond, Sampson and Laub (1993) focus more specifically on informal social controls or bonds that connect members of society to one another and to various social institutions, like family, school, and work. They argue that the relevance of these institutions changes as people age, with childhood institutions setting people on a particular trajectory of crime and deviance. Central to their theory is the condition that important life events in adulthood can serve as turning points in a delinquent trajectory contributing to a process of desistance, and stressing the importance of social bonds throughout the life course (Laub & Sampson, 2003).

Giordano et al. (2008) recognize that Laub and Sampson (2003) ignore religion,

mostly because only a few of the men in the Glueck and Glueck (1950) data benefited from religious involvement. Despite this, recent studies acknowledge that once people obtain strong bonds to religious organizations or from personal religiosity or religion-related experiences, these bonds may work as turning points that can help offenders to cope with the strains and stresses during and after imprisonment, make self-identity changes, develop a new and more prosocial identity, desist from delinquency and crime, and then shorten criminal careers (see Bakken, Gunter, & Visher, 2013; Chu, 2007; Giordano et al., 2008; Koenig, 1995; Maruna, Wilson, & Curran, 2006; Schroeder & Frana, 2009; Ulmer et al., 2012). Therefore, religiosity may play an important role in the desistance process of offenders that moves them away from returning to prior delinquency and crime.

Social Learning Theory

Social learning theories stress how individual actions are influenced by different social groups. People's behaviors are likely to be influenced and shaped by others, especially by family members or peer groups with whom they interact (Akers, 1996; Sutherland, 1947). According to social learning theory, delinquency and crime is learned through four distinct processes: differential association, definitions, imitation, and differential reinforcement (Akers & Sellers, 2004).

Although social learning theories say very little about religiosity, religiosity may play an important role in learning and reinforcing values or attitudes against delinquency and crime. Adolescents who participate in religious activities may become connected with other religious people who are less likely to engage in delinquency and crime and are more likely to express attitudes against such behaviors. By being exposed to such networks, religious adolescents are more likely to learn definitions that clearly consider delinquency

and crime as wrong or undesirable. Adolescents may learn through interactions with people who are committed to religiosity by imitating spiritual exemplars, observing models and systems of reinforcement within a religious context. In the process, being committed to religiosity, either through religious institutions (e.g., church) or personal experiences, may help develop a new and more prosocial identity though positive reinforcement to replace antisocial ones.

Social learning theory emphasizes the influence of delinquent peers in explaining individuals' delinquency and crime (Akers, 1998; Warr, 2002). Religiosity may increase the likelihood that adolescents will associate with and be influenced by conventionally oriented peers and mentors (Glanville et al., 2008), and decrease the likelihood of being influenced by peers with deviant beliefs, attitudes, and values (Burkett & Warren, 1987; Johnson et al., 2001). Furthermore, Adamczyk and Palmer (2008) argue that if adolescents have more religious friends, they are more likely to view delinquency as an unacceptable behavior because "friendship group norms are infused with religious justification" (p. 720). Later, Adamczyk (2009) has found that adolescents who are in a more religious friendship group are less likely to transition to sexual intercourse than those who have more secular friends, suggesting that adolescents' actual behaviors are influenced by religious attitudes and behaviors from friendship groups.

General Strain Theory

Agnew's (1985, 1992) general strain theory proposes that strain produces negative emotions, which may result in various outcomes, consisting of delinquent and criminal behaviors. Individuals experiencing strain may develop negative emotions requiring available coping responses (which can be deviant responses) as a way to alleviate inner

pressure or strain. As the theory applies to religiosity and crime, it is conceivable that the constraining effects of religiosity on the onset of or desistence from delinquent and criminal behavior may be because of religious adolescents having prosocial ways to cope with strain (Agnew, 2006). Religiosity therefore may reduce the risk of criminal involvement by providing positive social and coping skills that help to avoid or overcome stress and strain in the life, such that strained, but religious, people may be less likely to respond to life stress or strain with delinquency and crime than their equally strained, but less or non-religious, counterparts (e.g., Agnew, 2006; Cullen, 1994).

Several studies have found that religiosity may shield adolescents from negative emotions associated with strain, so that individuals with strong social ties and support formed through religiosity have resources to cope with stressful life events and adverse social circumstances in prosocial ways and are less likely to adopt criminal coping strategies (Broidy, 2001; Jang & Johnson, 2003, 2005; Johnson & Morris, 2008; Wills, Yaeger, & Sandy, 2003). Specifically, Jang and Johnson (2003) have found that religious individuals compared to those who are nonreligious are less likely to use deviant coping strategies in response to life problems. Johnson and Morris (2008) indicate that religiosity diminishes the impacts of stressful school problems on violent and property offenses, although the effects are small. Wills, Yaeger, and Sandy (2003) suggest that the impact of life stress on adolescent substance use is reduced by high levels of religiosity. Religiosity seems an important prosocial coping resource for strained individuals in managing negative effects that often accompany strain (Jang & Johnson, 2005; Pargament et al., 1998).

CHAPTER 3

METHODOLOGY

In order to address the above goals, this dissertation is conducted through the use of the data from the Pathways to Desistance Study. It should be noted that this dataset consists of a sample of 1,354 juvenile offenders who have been found guilty of relatively serious crimes. As most of the previous research investigating the religiosity-crime link has relied on the general population, it is important to examine different samples and populations, especially high-offending groups, to replicate relationships. It is highly possible that a different pattern of the religiosity-crime link may exist across individuals with more widespread offending histories. In addition, the Pathways study is a 7-year longitudinal investigation, in which participants make a transition from adolescence to early adulthood. This allows for an investigation of time-based changes of religiosity and crime during an important transitionary phase of the life course in which changes are most likely to occur. This particular dataset is also advantageous as it consists of relatively comprehensive measures of religiosity and criminal behavior, as well as a variety of other factors that allow for a further examination of relevant variables that may confound the religiosity-crime relationship.

3.1 DATA AND SAMPLE

The Pathways to Desistance Study is a longitudinal dataset that follow 1,354 serious adolescent offenders over seven years—from mid-adolescence through early adulthood

(Mulvey & Schubert, 2012; Schubert et al., 2004). These enrolled adolescents are recruited from the juvenile and adult court systems in Maricopa County (Phoenix), AZ and Philadelphia County, PA. These two locations are chosen due to several strategic reasons: (1) high rates of serious crimes committed by adolescent offenders; (2) potential participants are racially and ethnically diverse both within and between the 2 locations; (3) notable contrasts in how criminal justice systems operate; (4) sizable enough numbers of female offenders; and (5) political support for the study and the presence of experienced researchers (Schubert et al., 2004).

Adolescents are selected for potential enrollment in the Pathways study if they are between the ages of 14 and 18 at the time of their involvement in crime and have been adjudicated or found guilty of committing a serious crime. Almost all included offenses are felony crimes with the exception of less serious property offenses, sexual assaults, and weapons offenses. Furthermore, a large proportion of all offenses committed by male adolescents is constituted by drug offenses. In order to maintain the heterogeneity of the sample, this Pathways study limits the proportion of males charged with drug offenses to 15% of the sample at each location. No further restriction is placed on females or youths transferred or waived to adult court.

There are 10,461 adolescents who meet requirements of age and adjudicated crime processed in the juvenile and adult court systems in Maricopa County (Phoenix), AZ and Philadelphia County, PA between November 2000 and January 2003. Among these cases, 51% of the adolescents (5,382) who are found not guilty or charged with less serious crime as well as 12% of the adolescents (1,272) whose personal eligibility status is difficult to be determined due to insufficient court data are finally dropped. Of the remaining 3,807

eligible cases, approximately 47% are excluded because of potential case overload of the local interviewer or the restriction that male drug offenders are limited to 15% of the sample. This results in 2,008 adolescents who are approached for study participation. Approximately 67% of these adolescents finally agree to participate in this study. Ultimately, a total of 1,354 adjudicated adolescents enroll in the Pathways to Desistance Study (Maricopa County = 654 and Philadelphia County = 700).

Once enrolled, for those sent to the juvenile justice system, a baseline interview is completed within 75 days after their adjudication, whereas for those who are sent to the adult system, a baseline interview is completed within 90 days after their decertification or arraignment. Then, all enrolled adolescents are required to complete follow up computer-assisted interviews every six months for the first three years and annually thereafter. Thus, there are 11 total waves of data collected over a period of 7 years in the Pathways study. At each wave, the average retention rate is about 90%. All waves of data are employed for the analyses reported in this dissertation. Data from the waves covering 6-month time periods (the first 6 waves) are combined into 1-year periods, so that the intervals between time periods are equal across the full length of the study.

Potential Weakness of the Data

Although the longitudinal dataset from the Pathways to Desistance study has its own advantages for this dissertation, it is not without limitations. First, limitations surrounding generalizability should be noted. Although studying the religiosity-crime link over time within serious juvenile offenders is of particular interest in this dissertation, it has to be admitted that including only serious juvenile offenders may limit the generalizability of the findings to other segments of offenders who commit less

serious/minor offenses or the general/conventional population as a whole. For instance, it is highly possible that trajectory groups of either religiosity or crime identified in this dissertation may be extremely different if serious and minor offenders are both included in the investigation. Consequently, the relationship between religiosity and crime over time may be different. Thus, the findings of this dissertation may be not generalizable to broader populations. In addition, the generalizability of the findings may be relatively limited due to the small sample size of female offenders.

Second, there is a lack of information about participants prior to adolescence and after early adulthood. The sample consists of offenders transitioning from adolescence to young adulthood, who are in a particularly sensitive time for the development of religiosity (Good & Willoughby, 2008). Therefore, the findings of this dissertation may be only specific to this developmental period, and it remains unclear whether or not changes in religiosity during childhood or adulthood are similarly associated with changes in criminal behavior. More research is needed that explores these associations from childhood through adulthood.

Third, a measure of religious affiliation is not available in this dataset. As a result, it is impossible to investigate the role of religious affiliation in the explanation of crime among this sample of serious adolescent offenders. Considering that some fundamentalist groups (e.g., Christians and Mormons) are more inclined to be involved in delinquency and/or substance use than other denominations (e.g., Catholics) (Jensen & Erickson, 1979), the relationship between religiosity and crime may not be uniform across different religious denominations. Finally, panel attrition should also be noted. Some of the subjects are no longer able to participate because of various reasons, such as changes in contact details,

refusal, incapacity and even death, which cuts down the usable data to be drawn to formulate the conclusion. This attrition may also result in selection bias, in which the adolescents who drop out of a panel may be quite different from those who continue. All this may limit the ability to observe longitudinal patterns in criminal behavior and draw valid inferences from further analyses.

3.2 MEASUREMENTS

Independent Variables

Religiosity

Religiosity is captured by three dimensions: *Religious Attendance, Religious Importance,* and *Spirituality* during each interview period. *Religious Attendance* is measured by the question "During the past year, how often did you attend church, synagogue, or other religious service?" The responses are based on a 5-point scale ranging from "1=never" to "5=several times per week". *Religious Importance* is measured by the question "How important has religion been in your life?" The responses are based on a 5-point scale ranging from "1=not at all important" to "5=very important". *Spirituality* is measured by a scale created by Maton (1989) including three items: (a) "I experience God's love and caring on a regular basis"; (b) "I experience a close personal relationship to God"; (c) "Religion helps me to deal with my problems". The responses are based on a 5-point scale ranging from "1=not at all true" to "5=completely true". The reliability coefficients range from .88 to .95 across studied waves. A single scale score is computed by taking the mean of the three items with higher scores indicating a greater degree of spirituality across studied waves.

Dependent Variables[1]

Criminal Behaviors

Criminal behavior is accounted on both Official Arrest Records (OAR) and Self-Reported Offending (SRO) over the 7-year study period. The OAR relies on petitions found in juvenile records in each jurisdiction prior to age 18 and arrests appearing in FBI records thereafter. Officially based measures of offending often underestimate crime events that offenders actually have committed, because they only focus on crimes that lead to official detection (Hindelang, Hirschi, & Weis, 1981). Therefore, self-report data can be used here as a supplement to official records to capture those minor or missed deviant behaviors, though it is inherently biased by individuals' feelings at the time they are interviewed (e.g., social desirability). The SRO measure (Huizinga, Esbensen, & Weiher, 1991) is adapted for the Pathways study to assess each adolescent's involvement in crime, by asking respondents to indicate the frequency that they engage in 24 different criminal behaviors over the recall period.

Self-Reported Offending

The SRO scale consists of 24-items which indicate the respondents' involvement in different types of offenses. In this dissertation, only 22 different offenses are used, since 2 of the offenses, including breaking into a car to steal something and joy-riding/stealing car to ride around, are not interviewed at baseline and after 6 months. Three measures of offending are used in the following analyses. The full list of offenses in each measure is

[1] The dichotomous strategy is adopted for criminal behavior and hard drug use because of the number of observations reporting engagement in related behaviors. Only a small number of observations report involvement in at least one criminal behavior and hard drug use across the full length of the Pathways study. Several supplemental analyses are conducted to ensure that the results are not sensitive to particular methodological choices. The models with count outcomes of crime behavior and hard drug use are replicated. The pattern of results is very similar to those presented. Full results are available upon request.

available in Appendix A. *Total Offending* is a binary outcome indicating whether or not the respondent has ever engaged in any of 22 different offenses listed in the SRO inventory during each recall period. The total offending scale is found to have good internal consistency (alpha) ranging from .80 to .86 across studied waves. *Aggressive Offending* is a binary outcome indicating whether or not the respondent has ever engaged in any of 11 aggressive offenses during each recall period. It is determined that these items have acceptable internal consistency (alpha) ranging from .68 to .76 across studied waves. *Income-Related Offending* is a binary outcome indicating whether or not the respondent has ever engaged in any of 10 income offenses during each recall period. These items show good internal consistency (alpha) ranging from .69 to .79 across studied waves. As Table 3.1 indicates, *Total Offending* is reported in a majority of the observation periods (57%), while 48% and 37% of all observations report *Aggressive Offending* and *Income-Related Offending*.

Table 3.1. Descriptive Statistics for the Sample

	All Sample	**Younger Cohort Group (aged 14-16)**	**Older Cohort Group (aged 17-19)**
Dependent Variables			
Total Offending	.57	.58	.56
Aggressive Offending	.48	.49	.45
Income-related Offending	.37	.37	.37
Official Arrest	.22	.23	.22
Cigarette Smoking	4.74 (3.66)	4.63 (3.63)	4.93 (3.69)
Alcohol Use	2.92 (2.29)	2.84 (2.25)	3.06 (2.36)
Marijuana Use	2.96 (2.87)	3.01 (2.89)	2.89 (2.86)
Hard Drug Use	.18	.18	.18
Time-Variant Variables			
Religious Attendance	1.93 (1.19)	1.94 (1.19)	1.91 (1.19)
Religious Importance	3.11 (1.32)	3.10 (1.32)	3.12 (1.33)
Spirituality	3.09 (1.23)	3.05 (1.21)	3.14 (1.26)
Age	19.42 (2.56)	18.72 (2.43)	20.59 (2.34)
Educational Achievement	5.62 (2.35)	5.26 (2.45)	6.22 (2.03)
Enrolment Status	.48	.53	.38
Weeks Employed	12.83 (17.42)	12.09 (16.97)	14.06 (18.07)
Romantic Relationship Status	.45	.42	.50
Parenthood Status	.37	.30	.47

Moral Disengagement	1.47 (.35)	1.47 (.35)	1.46 (.34)
Peer Delinquency	-.001 (.93)	-.001 (.93)	-.002 (.92)
Low Self-Control	-1.60e-10 (.89)	2.38e-10 (.89)	-8.14e-10 (.89)
Incarceration Length	69.25 (120.94)	61.42 (115.94)	82.20 (127.75)
Time Supervised	99.22(128.24)	98.13 (127.04)	101.00 (130.20)
Baseline Variables			
Male	.86	.85	.88
Race			
White	.20	.22	.17
Black	.41	.40	.43
Hispanic	.34	.34	.34
Others (Reference category)	.05	.04	.06
Family Structure			
Biological-Parent Family	.15	.16	.13
Step-Parent Family	.20	.21	.20
Single-Parent Family	.47	.47	.46
Others (Reference category)	.18	.16	.21
Site			
Philadelphia	.52	.50	.55
Socioeconomic Status	51.41 (12.29)	51.73 (12.31)	50.89 (12.26)
Community Involvement	.26 (.58)	.29 (.61)	.21 (.51)
School Involvement	.81 (1.11)	.82 (1.10)	.79 (1.11)
School Attachment	3.19e-09 (.85)	2.63e-09 (.85)	4.09e-09 (.85)
Mother-Child Relationships	-3.42e-09 (.84)	-4.85e-09 (.85)	-1.10e-09 (.81)
Parental Monitoring	2.80 (.86)	2.96 (.81)	2.52 (.88)
Offending History	2.92 (2.14)	2.64 (1.97)	3.36 (2.33)
Early Onset of Behavior Problems	1.52 (1.19)	1.53 (1.18)	1.51 (1.21)
N (individuals)	1354	829	525
N (person waves)	10,832	6,632	4,200

Notes: Values in parentheses represent standard deviations from the mean. Negative values are a result of standardizing the indices.

Official Arrest Records

Using official criminal records of each respondent, a binary indicator of the petitions/arrest record is created by wave, indicating whether or not the respondent is arrested for a criminal offense during each recall period. The measure of official arrest includes the initial arrest and petition to court that enabled the respondent to be enrolled in the Pathways study, as well as the subsequent arrest across studied waves. Only 22% of all observations report being arrested officially across waves.

Substance Use

Four measures of substance use are used as outcomes: *Alcohol Use*, *Cigarette*

Smoking, *Marijuana Use*, and *Hard Drug Use* (i.e., sedatives, stimulants, cocaine, opiates, ecstasy, hallucinogens, inhalants, and amyl nitrate). Regarding *Alcohol Use, Cigarette Smoking*, and *Marijuana Use*, respondents are asked to report how frequently they have used alcohol, cigarettes, and marijuana. Responses are based on a 9-point scale including "1 = not at all, 2 = 1-2 times, 3 = less than 1 per month, 4 = once per month, 5 = 2-3 times per month, 6 = once per week, 7 = 2-3 times per week, 8 = 4-5 times per week, and 9 = everyday" (*Alcohol Use*: M=2.92, SD=2.29; *Cigarette Smoking*: M=4.74, SD=3.66; *Marijuana Use*: M=2.96, SD=2.87). Lastly, *Hard Drug Use* is a binary variable indicating whether or not the respondent has ever used hard drugs during the recall period. Only 18% of all observations report *Hard Drug Use*.

Control Variables

Baseline Covariates[2]

Gender is a binary variable indicating whether or not the respondent is male. *Race* is determined from demographic questions included in the baseline interview. Dummy coded variables indicating *Black, White, Hispanic,* and *Others* (reference category) are computed. *Site* is a dummy variable indicating *Philadelphia=1* and *Phoenix=0. Family Structure* is captured in the baseline interview. Four categories are created to reflect respondents with varying family dynamics: respondents who live with both biological parents, respondents who live with two parents but both are not the biological parents (i.e., one is a step-parent), respondents who live in a single parent household, and others (i.e.,

[2] Only the baseline information of *Community and School Involvement*, *School Attachment*, *Mother-Child Relationship*, and *Parental Monitoring/Limit Setting* is used for further analyses. Given that most respondents are older adolescents and young adults, the influences of school and family fade away and a large number of missing values emerge over time. With respect to *Community Involvement*, adolescent offenders are less likely to participate in structured community activities when they are institutionalized, which also result in a lot of missing data.

two adoptive parents, other adult relative, etc.). These designations are noted as *Biological-Parent Family, Step-Parent Family, Single-Parent Family,* and *Others* respectively. *Others* is used as the reference category. *Socioeconomic Status* is measured by a pre-constructed parental *Index of Social Position* ranging from 11 to 77, which is computed based on both education and occupation obtained by the respondent's parents in the baseline interview.

Official criminal history data is used to construct a measure of *Offending History*, such that the number of arrests prior to the arrest that leads to the adolescent's entry into the Pathways to Desistance Study. *Early Onset of Behavior Problems* is a count variable indicating the number of problem behaviors the respondent has engaged in before age 11, consisting of 5 items, such as getting into to trouble for cheating, disturbing class, being drunk/stoned, stealing, and fighting. This scale ranges from 0 to 5, with higher scores indicating higher levels of early onset behavior problems.

Community Involvement is measured by the *Community Involvement* scale assessing the adolescent's involvement in structured community activities. Scores indicate the extent of the adolescent's involvement in four different community organizations (e.g., sports teams, scouts, church related groups, and volunteer work). This scale ranges from 0 to 4, with higher scores indicating more community involvement. The degree of *School Involvement* is measured by a pre-constructed variable, in which the participants are asked to report the total number of extra-curricular school activities.

School Attachment is measured by two pre-constructed variables used to evaluate the adolescent's educational experience consisting of *Bonding to Teachers* and *School Orientation*. To be more specific, these two constructed variables are captured by separate calculated mean scores on the *Bonding to Teachers* scale (e.g., "Most of my teachers treat

me fairly.") and the *School Orientation* scale (e.g., "Schoolwork is very important to me."). In these subscales, respondents are required to rate a total of 13 statements using a 5-point scale ranging from "1=strongly disagree" to "5=strongly agree", in which higher scores indicate a greater degree of academic commitment. The results of exploratory factor analysis indicate that the two constructed variables load on one factor with factor loading scores all above .67, which are thus grouped into a standardized index (alpha=.62).

The quality of *Mother-Child Relationship* is measured by two pre-constructed variables *Maternal Warmth* and *Maternal Hostility*. *Maternal Warmth* and *Maternal Hostility* are captured by separate calculated mean scores of the maternal warmth and hostility scales, with higher scores indicating more warmth and hostility. To be more specific, the warmth scale includes 9 items assessing respondents' perceptions of maternal acceptance, involvement, and affection (e.g., "How often does your mother act supporting and understanding of you?" and "How often does your mother tell you she loves you?"). The hostility scale includes 12 items assessing respondents' perceptions of their parents as harsh, critical, and verbally/physically abusive (e.g., "How often does your mother shout or yell at you because she was mad at you?" and "How often does your mother push, grab, hit, or shove you?"). Responses are based on a 4-point scale ranging from "1=always" to "4=never." The results of exploratory factor analysis indicate that the two constructed variables load on one factor with factor loading scores all above .67, which are thus grouped into a standardized index (alpha=.63).

Parental Monitoring is used to capture the degree to which the respondent's primary caregivers engage in monitoring and limit setting. It is measured by a pre-constructed index, in which a mean score of the 9-item Parental Monitoring Inventory is

calculated for each respondent. The Parental Monitoring Inventory consists of 9 items such as "How much does your parent know about who you spend time with?" and "How often do you have a set time to be home on school or work nights?" Responses are based on a 4-point scale ranging from "1 = doesn't know at all/never" to "4 = knows everything/always". Higher scores reflect more parental monitoring/limit setting.

Time-Varying Covariates

Age is operationalized as the respondent's age at the time of the interview. The *Age* represents the interview date minus the subject's date of birth truncated to a whole number. *Educational Achievement* is measured by the highest grade the respondent achieved during each recall period ranging from 6^{th} grade or less (1) to a college degree (10). Responses are left on a continuous scale to represent *Educational Achievement* with higher values representing greater educational attainment. *Enrollment Status* is measured by the item asking respondents to report whether they are enrolled in school during each recall period (1=yes, 0=no). *Weeks Employed* is operationalized as the number of weeks where a respondent works in any legal job, which is used to capture the respondent's employment status during each recall period. *Incarceration Length* measured by the total number of days that the respondent spends in jail or prison is used to capture length of imprisonment during each recall period. *Time Supervised*, the time supervised in all institutional settings, is captured by the number of days that the respondent is supervised institutionally (i.e., removed from the community) during each recall period.

The measure of *Romantic Relationship Status* includes both marital and non-marital relationships. Respondents are asked to report if they are currently married in the recall period. If not currently married, respondents are asked if they are currently involved in a

serious romantic relationship. Then, the measure is coded 0 = not married or not in a romantic relationship, and 1 = married or in a romantic relationship. Number of children involved acts as a proxy for *Parenthood Status*. *Parenthood Status* is a dichotomous variable for whether the respondent reports having, at least, one child (1) or none (0).

Moral Disengagement is measured by a pre-constructed index, in which the mean of 32 items is computed with higher scores reflecting a greater moral disengagement. The 32 items assessing adolescents' moral beliefs are based on the following eight dimensions: "moral justification", "euphemistic language", "advantageous comparison", "displacement of responsibility", "diffusion of responsibility", "distorting consequences", "attribution of blame", and "dehumanization" (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). Participants respond to each item on a 3-point scale ranging from "1=disagree" to "3=agree". These items show good internal consistency, in which reliability coefficients range from .88 (baseline) to .92 (24 month), as the Pathways study suggested.

Peer Delinquency is assessed by two pre-constructed variables: *Peer Antisocial Behavior* and *Peer Antisocial Influence*. To be more specific, these two constructed variables are captured by separate calculated mean scores on the *Peer Antisocial Behavior* scale and the *Peer Antisocial Influence* scale. The *Peer Antisocial Behavior* scale contains 12 items, asking respondents to report how many of their friends have engaged in the 12 antisocial behaviors during each recall period (e.g., "During the last six months how many of your friends have sold drugs?). The *Peer Antisocial Influence* scale consists of 7 items, in which respondents are asked to report how many friends have encouraged them to engage in 7 antisocial behaviors (e.g., "During the last six months how many of your friends have suggested that you should sell drugs?"). Of these 19 items about peer

delinquency, responses are based on a 5-point scale ranging from "1=none of them" to "5=all of them". The results of exploratory factor analysis indicate that the two pre-constructed variables load on one factor with factor loading scores all above .84, which are thus grouped into a standardized index. The reliability coefficient ranges from .82 to .87 over the interviewed time period.

Low self-control is measured by two pre-constructed variables of the Weinberger Adjustment Inventory (WAI): *Impulse Control* and *Suppression of Aggression*. These two constructed variables are captured by separate calculated mean scores on the *Impulse Control* scale and the *Suppression of Aggression* scale, with higher scores reflecting more positive behaviors (i.e., more impulse control and greater temperance). To be more specific, these two subscales consist of 15 items, in which respondents are asked to report how much their behavior during each recall period matches a series of statements provided, such as, "I say the first thing that comes into my mind without thinking enough about it" and "People who get me angry better watch out". Their responses are based on a 5-point scale ranging from "1=false" to "5=true". The results indicate that the two pre-constructed variables load on one factor with factor loading scores all above .76, which are thus grouped into a standardized index. The reliability coefficient ranges from .69 to .75 over the interviewed time period.

3.3 ANALYTIC TECHNIQUES

Identifying Trajectory Groups of Religiosity

The Group-Based Trajectory Modeling (GBTM) approach is used to identify distinctive developmental trajectories of religiosity in terms of religious attendance, importance, and spirituality over time. This method developed by Nagin and colleagues

(Jones, Nagin & Roeder, 2001; Nagin, 2005; Nagin, 1999; Nagin & Tremblay, 1999) is responsive to individual-level heterogeneity in developmental trajectories. Given models used in previous studies assessing the associations between both changes in religiosity and crime, they often overlook the inherent heterogeneity of religiosity within individuals, or distinct subgroups that have unique developmental patterns of religiosity. GBTM is well suited to study developmental trajectories of religiosity, since it allows for classifying individuals into distinct subgroups that follow a similar pattern of change in religiosity over time, and then model a discrete mean trajectory for each subgroup (Muthén & Muthén, 2000). This methodology uncovers patterns based on observed data without forcing the researcher to make arbitrary group cutoffs (e.g., high vs. low religious participation). Although these trajectory groups are only approximations, they are helpful in illustrating different patterns of religiosity that individuals may follow throughout their lives. As such, the distribution of individual differences of religious development can be captured by the multiple trajectories identified through the use of the GBTM.

A number of steps need to be taken in order to choose the correct model for group-based trajectory analysis (Nagin, 2005). The researcher needs to specify the number of groups, the shape of each trajectory (linear, quadratic, etc.), and the type of distribution (i.e., censored normal) prior to estimating individual trajectories. Final model selection requires a determination of the number of groups that best describe the data. The Bayesian Information Criterion (BIC) statistics are used as the primary formal test to determine the optimal number of groups, and both BIC statistics and model parameters are helpful in specifying the correct form of each trajectory. Because there are times when BIC would marginally improve as more groups are added to the model, researcher judgment and other

diagnostic tests are also used in determining the best-fitting model that conveys all of the substantive features of the data while remaining parsimonious (Nagin, 2005).

Given the cohort effects that exist in the Pathways study, the sample is divided into two separate groups: younger cohort (aged 14-16 in the baseline interview) and older cohort (aged 17-19 in the baseline interview). This approach is used to address the heterogeneity within the sample across quite a large age range, balancing considerations on using age or month to capture developmental trajectories of religiosity. In addition, the dissertation can further compare the results from the younger cohort group and the older cohort group that start from different developmental time periods: mid-adolescence and late-adolescence. Trajectories of religiosity in terms of religious attendance, importance, and spirituality are thus identified for the younger and older cohort groups respectively.

A SAS procedure (PROC TRAJ) is utilized to estimate trajectories of religiosity in the GBTM (Jones et al., 2001). In these analyses, the censored normal model is used since the dependent variables—different dimensions of religiosity—are based on a scale ranging from 1 to 5. The censored normal model assumes a normal distribution, which is especially useful for these analyses because it takes into account the clustering that exists at the scale minimum and maximum. A polynomial relationship is used to model the link between month and religiosity. Model selection is pursued in three steps. First, models with progressively more groups are tested until the model fit can no longer be improved. To be more specific, the GBTM starts with a single group and an additional group is added to successive models until the best fitting model is found. If there is no substantial variation in model fit when comparing the *k* group model (a subsequent, more complex model) to the *k*-1 group model (a previously tested, simpler model), the most parsimonious model (*k*-

1 group model) is selected (Muthén & Muthén, 2000).

The BIC is used as a test statistic for selecting the number of groups that best represent the heterogeneity among the trajectories. When the BIC marginally improves as more groups are added to the model, additional parameters or criteria are used simultaneously. In order to compare two models with different numbers of groups, the following estimate of the log Bayes Factor is used: 2loge (BIC) $\approx$ 2(ΔBIC) (Jones et al., 2001; Nagin, 2005). In order to compute ΔBIC, the BIC value of the simpler model is subtracted from the more complex model, and this value is thereafter multiplied by two. In accordance with recommendations of Jones et al. (2001), an estimated Log Bayes factor larger than 5 is considered as strong evidence for the more complex model. The selection of the model with the largest BIC is recommended, but model selection would be also based on domain knowledge and reasonable judgment (Nagin, 2005, p.74-77). Furthermore, the size of each trajectory group should be reasonably large (above 5%).

After identifying the ideal number of groups, different shapes for the trajectories (linear, quadratic, cubic, etc.) are tested in a second step. Notably in the first step of the model fitting process, all groups are defined as following a cubic shape. Thus, the shape of each trajectory is adapted subsequently to alternatives that best fit the respective groups. Once the ideal number of groups with specified shapes are identified, in the third step, model adequacy is tested using the average posterior probabilities (APP) of group membership. The APP measures the likelihood of each individual belonging to its assigned group. Nagin (2005) recommends that the APP should exceed a minimum of .70 for each group. An APP of above .70 indicates that, on average, individuals are well assigned to their groups.

Growth Curve Models (GCM)

One of the major stages in the dissertation involves a longitudinal analysis of whether changes in religiosity over time correspond with changes in criminal behavior. Using GCM is advantageous for achieving this goal, as it allows for modeling change in outcome trajectories over time. To be more specific, GCM is able to examine not only the overall trend of change (the group level trajectory), but also the amount of within individual change across time, as well as between individual variability. It can also represent differences over time taking into account the initial level status (i.e., intercept), the shape and rates of change over time (i.e., slope), and the relationship between the two at both individual and group levels (Geiser, 2012; Preacher, Wichman, MacCallum, & Briggs, 2008; Schumacker & Lomax, 2004). Additionally, it allows for incorporating both time-invariant and time-variant covariates to explain variability in the initial level status and rates of change over time at the individual level. Notably, unconditional GCMs are constructed to explore the growth trajectory of crime before estimating multiple-group GCMs. Multiple-group GCMs are used to examine whether inter-individual differences in average crime for the first wave ("intercepts") and inter-individual changes in crime across all observed waves ("slopes") can be explained by trajectory groups of religiosity.

Unconditional Growth Curve Models

Unconditional GCMs (without any covariates) are conducted to examine the average growth pattern of each crime and deviance over time in the population, as well as whether there is significant individual variability within the sample in growth. If sufficient individual variability exists in either intercept or slope, trajectory group membership of each dimension of religiosity with other predictors are used to predict this variance in

conditional models. Specifically, a number of unconditional GCMs are estimated to explore the functional form of growth which gives the best fit for different types of substance use and criminal behavior. Separate analyses are performed for each crime and deviance.

The analyses begin by assuming a single group and applying an unconditional GCM with a linear growth function only. However, because antisocial behavior is often episodic (e.g., Lahey et al., 1995) and given the shape of the age-crime curve, a quadratic growth function is also fitted to the data. In contrast to the linear-only model, the quadratic model allows for curvilinear trends across the ages. As such, the quadratic growth model not only contains an intercept factor and a linear factor, but also a quadratic factor.

In order to determine the individual and comparative fit of the GCMs, a number of overall fit indices are considered. Specifically, the Tucker-Lewis index (TLI; Tucker & Lewis, 1973) and the comparative fit index (CFI; Bentler, 1990) are calculated. Values on these two measures range between zero and one, where one is an ideal fit. The Root Mean-Square Error of Approximation index (RMSEA; Steiger & Lind, 1980), the Standardized Root Mean Square Residual (SRMR), and the Bayes Information Criterion (BIC; Schwarz, 1978) are also used to evaluate the model fit. The RMSEA has a minimum of zero and no upper limit, the closer to zero the value is, the better is the model fit. Steiger (1989) as well as Browne and Cudeck (1993) suggest guidelines such that RMSEA values of less than .05 indicate a very good fit, those greater than .10 represent a poor fit, and those values in between reflect a moderate fit. The RMSEA values of 1.0 or greater are considered to have an unreasonable degree of fit (Browne & Cudek, 1993). Given the SRMR, an absolute measure of fit, a value of zero indicates perfect fit. A value less than .08 is generally

considered a good fit (Hu & Bentler, 1999). Additionally, smaller BIC values indicate better fit than that of higher values (no matter the actual BIC value). The comparative fits of the models are also computed by using chi-square difference tests for nested models.

However, it is possible to have a model that has good overall fit on several or all of the overall fit indices, but that has poor fit in terms of its latent growth curve factors (or vice versa) (Bollen & Curran, 2006). Consequently, latent growth curve factors (i.e., intercept, linear, and quadratic factors) are also used to assess how well each model corresponds to the data as a whole. Each factor has two parameter estimates, a mean and variance, which capture the group-level trend and individual variability in trajectories, respectively. To be more specific, the significant mean intercept represents that the mean level of the outcome (i.e., substance use and criminal behavior) at baseline is significantly different from 0. Two additional growth curve parameters, linear and quadratic, capture changes in the outcome across time.

In particular, the linear slope captures linear change, and the quadratic slope captures nonlinear change over time. The mean linear slope can be negative, indicating that individuals decrease their level of the outcome over time. If it is positive, it means that individuals increase their level of the outcome over time. Additionally, if the mean quadratic slope is positive, nonlinear change is upward. If it is negative, it is downward. Although the mean captures the average trend for the entire sample, the variance associated with each growth curve parameter indicates individual variability in trajectories. That is, statistically significant variances for the intercept, linear slope and quadratic slope indicate that the baseline outcome as well as the shape and rate of linear and nonlinear change in the outcome vary significantly across individuals. Individual variability in both the initial

level and the rate of change in the outcome indicates the need to consider relevant characteristics to account for the variability among individuals.

Multiple-group Growth Curve Models

Multiple-group GCMs, an extension of GCMs, are used to assess whether and how distinct trajectories of religiosity relate to changes in multiple measures of crime over time. In addition to possessing features of the GCM, the multi-group GCM makes it possible to examine differences in outcome growth trajectories across multiple identified groups. Means and variances of growth parameters are estimated to be different across the groups. Separate intercepts and slopes can be used to make comparisons across groups. To this end, the multi-group GCM is well suited to examine differences in growth trajectories of crime across multiple observed trajectory groups of religiosity. Initial levels of crime and its rate of change over time can be estimated and compared across religiosity trajectory groups.

The multi-group GCM is estimated in two steps. First, religiosity trajectory groups found in GBTM are coded as dummy variables. These trajectory groups are then entered into the model without covariates as grouping variables to test their differences in both initial levels (intercepts) and change rates (slopes) of crime over time. Second, the model with both time-varying and time-invariant covariates is estimated to examine whether any of the religiosity trajectory group differences in the intercepts and slopes of crime can be attributed to these control variables. Particularly, a series of multi-group GCMs are estimated separately for official arrest, self-reported total offending, aggressive offending, income-related offending, and substance use in terms of alcohol use, cigarette smoking, marijuana use, and hard drug use based on distinct trajectories of religious attendance, religious importance, and spirituality respectively. All these analyses are conducted on both

younger and older cohort groups.

Missing Data Analysis[3]

Multiple imputation is used to handle missing cases in this dissertation. In the longitudinal data, since it is almost impossible to follow all of the subjects over time, missing cases are inevitable. Many missing data strategies, such as mean imputation and listwise and pairwise deletion, may cause unnecessarily reduced sample sizes or biased parameter estimates (Graham, Hofer & Piccinin, 1994). The reduction of sample size causes standard errors to increase, confidence intervals to widen, and statistical power of associations to decrease. In addition, biased estimations are produced since that the imputation approaches used in these methods do not actually rely on dependent variables. This scenario becomes more problematic when the variable of interest is related to the other covariates.

To avoid these problems, the dissertation uses a multiple imputation technique for missing data, in which introducing appropriate random error into the imputation process makes it possible to produce approximately unbiased estimates and unbiased standard errors of all parameters based on the conditional distribution of any variables of interest in the data and other relevant additional information. In other words, after missing cases are predicted using the observed cases and the parameters governing the distribution of the data, the parameters are then re-estimated using the observed cases and predicted missing cases. To properly account for variability due to unknown values, the imputation process

[3] Several supplemental analyses are conducted to ensure that the results are not sensitive to the particular strategy addressing missing data. The dissertation also employs an alternate missing data strategy. For those independent variables that contain missing information, dummy missing indicators are created and missing values are replaced with sample means. In addition, missing values in dependent variables are deleted. All key findings with a sample size after the listwise deletion are closely replicated.

is repeated *N* times, where *N* is usually greater than 3. Each repetition results in a completed dataset that is analyzed using standard complete-data methods. The values of parameter estimates across the *N* multiple imputations are averaged to obtain better estimates than those from single imputation.

Since missing data imputation methods can be valid under the assumption of missing at random (Allison, 2002), missing data patterns are checked to see if data are missing at random. After checking missing data patterns, the multiple imputation method is used to deal with missing data, in which 10 imputed datasets are created. The multiple imputation technique is only applied for GCM analyses[4], because the GBTM already accommodates missing data when it is used to identify trajectories of each dimension of religiosity (Jones, Nagin &Roeder, 2001). GBTMs account for missing data through maximum likelihood techniques.

[4] According to Enders (2010), it may cause the estimated association between dependent variables and independent variables to be biased toward the null (i.e. underestimated) if only independent variables are imputed. This approach assumes that independent variables are uncorrelated with dependent variables. Therefore, in this dissertation, the dependent variables are included in the imputation model and then later the analyses are restricted to only those observations with observed values in dependent variables (Allison, 2012).

CHAPTER 4

RESULTS

4.1 MISSING DATA ANALYSIS[5]

The number and proportion of missing values among variables of interest, the distribution of missing values across observations, and the presence of the predictors on missingness of the outcome variables are examined to check patterns of missing data. First, the number and proportion of missing observations among variables of interest is examined. There is less than 1% missingness in variables of *Socioeconomic Status* and *Community Involvement*. There is around 4% missingness in the variable of *Mother-Child Relationships*. There is less than 10% missingness in *Self-Report Total Offending*, *Aggressive Offending*, *Income-Related Offending*, *Cigarette Smoking*, *Alcohol Use*, *Marijuana Use*, *Hard Drug Use*, *Enrollment Status*, *Moral Disengagement*, *Peer Delinquency*, *Low Self-Control*, *Incarceration Length*, *Time Supervised*, *School Involvement,* and *School Attachment*. There is more than 10% missingness in *Romantic Relationship Status* and *Parental Monitoring* variables. There is around 15% missingness in *Educational Achievement*. Variables with a high proportion of missing information (more than 10%) should be noted as they may have the greatest impact on the convergence of the specified imputation model.

[5] The results of the missing data analysis are not shown in the tables but are available upon request.

Second, the distribution of missing values across observations is investigated in missing data patterns. There are 65.3% of observations in the data that have complete information on all variables of interest. There is a total of 90 patterns for the specified variables. After examining these patterns, there is not a set of variables that are missing together following a specific reason or pattern. Lastly, logistic analyses are conducted to investigate whether there are important predictors on missingness of the outcome variables. Logistic models with covariates having missing values and with all covariates are constructed respectively. No covariates except *Age* show significance in terms of predicting missingness of each single crime and deviance in all logistic models. With respect to models with covariates having missing values, *Site* also indicates significance in predicting missingness of *Cigarette Smoking* and *Income-Related Offending*. However, this may be because of the way the data is collected, and it is not the result of a specific reason. Overall, the results show that participants who have missing values on each single crime and deviance are not different from those with observed values.

In sum, there are no significant patterns of missingness in the used data. This to some extent suggests the data is missing at random. Thus, the technique of multiple imputation can be used to address missing values in the GCMs since that the approach can be valid when the assumption of missing at random is met.

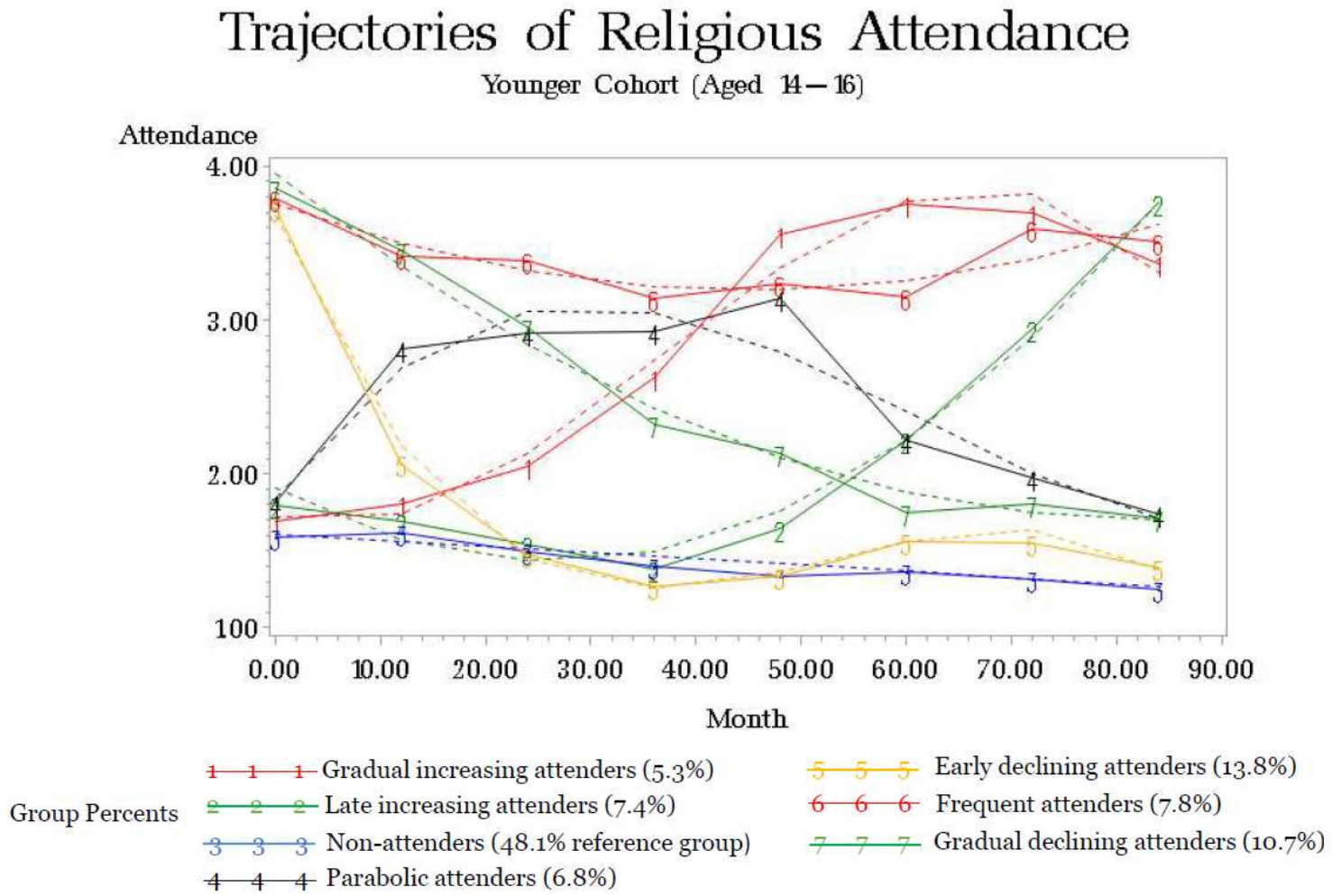
4.2 TRAJECTORY GROUPS OF RELIGIOSITY

This stage of analysis focuses on identifying trajectory groups of each dimension of religiosity. Most importantly, a series of fit statistics are used to determine the optimal number of trajectory groups. As detailed in Chapter 3, the statistics of BIC and LBF and the size of each trajectory group are used as a guide to determine the best-fitting model of

each dimension of religiosity (see Table B.1-B.3 in Appendix B). Overall, a seven-group model emerges as the best-fitting model for each dimension of religiosity across both younger and older cohort groups. The sizes of each identified trajectory group are all above 5%. The model adequacy of the final seven-group model with specific shapes indicates that individuals are well assigned to their groups, in which the APPs are all around or above .70. The specific trajectories of each dimension of religiosity are showed in Figure 4.1-4.6.

Trajectories of Religious Attendance

Trajectories from the seven-group model for the younger cohort group are displayed in Figure 4.1. *Frequent attenders* (7.8 percent) have a high frequency of religious participation, attending religious services at least once a week (on average) throughout all interviewed waves, but with slight variations (decreasing and then increasing between once a week and once or twice per month slightly). *Early declining attenders* (13.8 percent) attend religious services at a relatively high frequency at baseline (aged 14-16), but experience a rapid decline in religious participation. One year later (aged 15-17), early decliners are attending religious services only a couple of times a year, and most have stopped attending by the age of 18-20 when religious participation starts to increase and then decrease slightly but overall maintains at the low frequency. There is only a slight change in religious participation in young adulthood, making it difficult to determine whether this trend will continue later in life. *Gradual declining attenders* (10.7 percent) have a high frequency of religious participation at baseline (aged 14-16), and then experience a steady decline in religious involvement throughout adolescence into young adulthood (until approximately the age of 21-23). *Parabolic attenders* (6.8 percent) attend religious services at a somewhat low frequency at baseline (aged 14-16), increase their

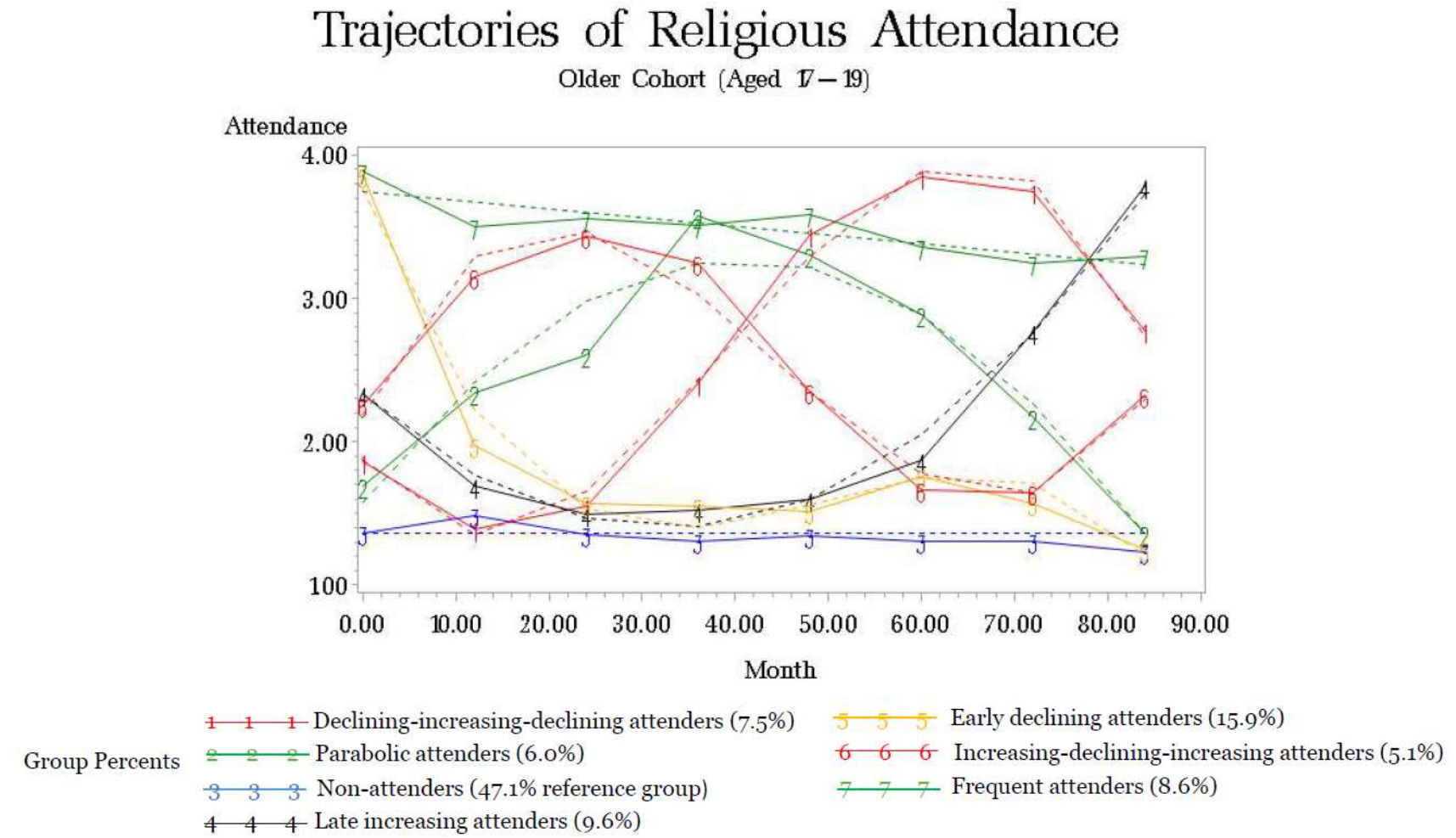


Notes: Expected (dashed lines) Versus Observed (solid line) Trajectories

Figure 4.1: Trajectories of Religious Attendance for the Younger Cohort Group

participation until approximately the age of 18-20, and then decline throughout the remainder of the observed life course. Gradual increasing attenders (5.3 percent) have a low frequency of religious participation at the age of 14-16, and then experience a steady increase in religious involvement throughout adolescence until approximately the age of 19-21 when religious participation starts to decrease. There is only a slight decrease in religious participation in young adulthood, making it difficult to determine whether this trend will continue later in life. *Late increasing attenders* (7.4 percent) have a relatively low frequency of religious participation until the age of 18-20 before experiencing a steady increase throughout the remainder of the observed life course. Finally, youth classified as *non-attenders* (48.1 percent) never/rarely attend religious services throughout adolescence and young adulthood.

Trajectories from the seven-group model for the older cohort group are displayed in Figure 4.2. Trajectory groups of religious participation from the older cohort group are similar with those from the younger cohort group. *Frequent attenders* (8.6 percent) have a high frequency of religious participation, attending religious services at least once a week (on average) throughout all interviewed waves, but with a slight decrease to once or twice per month. *Early declining attenders* (15.9 percent) attend religious services at a relatively high frequency at baseline (aged 17-19), but later experience a rapid decline in religious participation. One year later (aged 18-20), early decliners are attending religious services only a couple of times a year, and most have stopped attending by the age of 22-23 when religious participation starts to increase and then decrease slightly. There is only a slight change in religious participation in young adulthood, making it difficult to determine whether this trend will continue later in life. *Parabolic attenders* (6 percent) attend



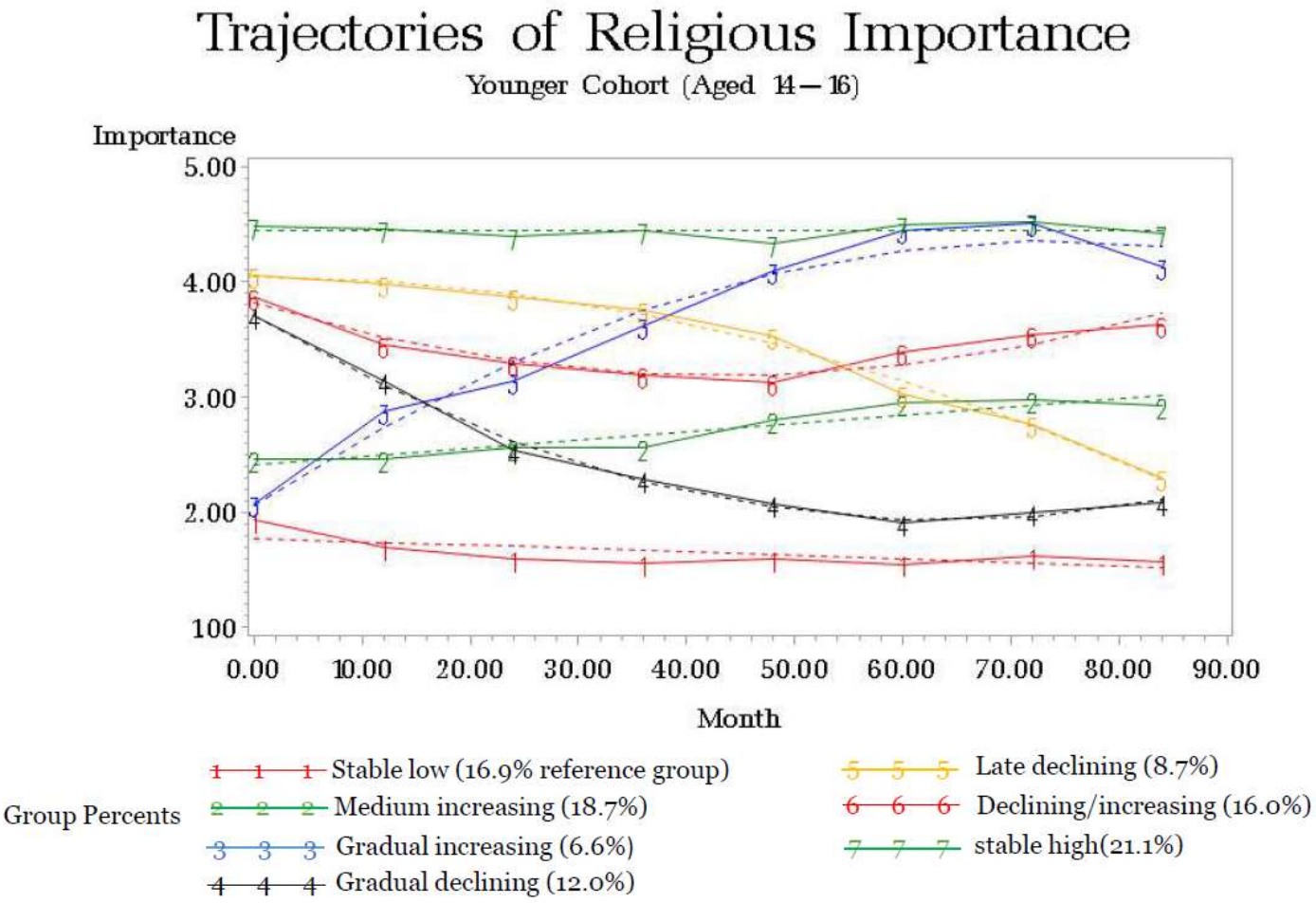
Notes: Expected (dashed lines) Versus Observed (solid line) Trajectories

Figure 4.2: Trajectories of Religious Attendance for the Older Cohort Group

religious services at a somewhat low frequency at baseline (aged 17-19), increase their participation until approximately the age of 20-22, and then decline throughout the remainder of the observed life course. *Increasing-declining-increasing attenders* (5.1 percent) attend religious services at a low frequency at the age of 17-19, but experience a rapid increase in religious participation until the age of 19-21, and then experience a steady decline in religious involvement until approximately the age of 22-24 when religious participation starts to increase slightly. *Declining-increasing-declining attenders* (7.5 percent) have a low frequency of religious participation at the age of 17-19 with a slight decrease within one year, and then experience a steady increase in religious involvement throughout adolescence until approximately the age of 22-24 when religious participation starts to decrease. *Late increasing attenders* (9.6 percent) have a relatively low frequency of religious participation until the age of 21-23 before experiencing a steady increase throughout the remainder of the observed life course, though there is a slight decrease during late adolescence. Finally, youth classified as *non-attenders* (47.1 percent) never or rarely attend religious services throughout adolescence and young adulthood.

Trajectories of Religious Importance

Trajectories from the seven-group model for the younger cohort group are displayed in Figure 4.3. The *stable high* growth trajectory class (21.1 percent) includes individuals who believe that religion is extremely important in their life and their belief sustains at a pretty high level over time. The *late declining* growth trajectory class (8.7 percent) includes individuals who believe religion is pretty important until the age of 18-20 before experiencing a gradual decline (considering religion as not too important) throughout the remainder of the observed life course. The *declining-increasing* growth

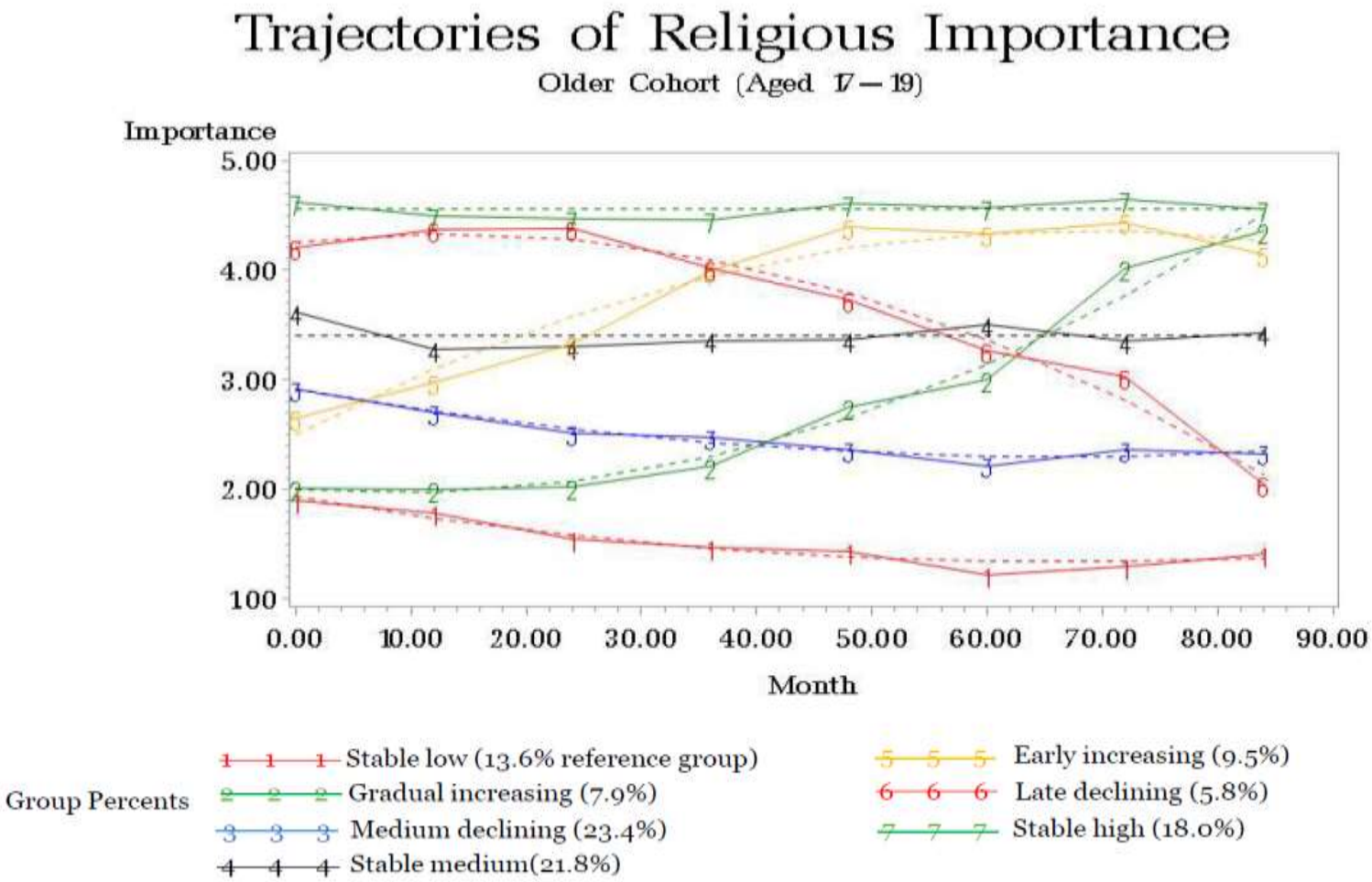


Notes: Expected (dashed lines) Versus Observed (solid line) Trajectories

Figure 4.3: Trajectories of Religious Importance for the Younger Cohort Group

trajectory class (16 percent) includes individuals whose beliefs in religion experience a slight change from pretty important to somewhat important. Specifically, the degree of religious importance gradually declines among the individuals until the age of 18-20 before experiencing a gradual increase throughout the remainder of the observed life course. The *gradual declining* growth trajectory class (12 percent) includes individuals who believe religion is pretty important at baseline (aged 14-16), and then experience a steady decline in religious importance from adolescence into young adulthood (until approximately the age of 21-23). The *medium increasing* growth trajectory class (18.7 percent) includes individuals whose religious importance increases from "not too important" to "somewhat important". The *gradual increasing* growth trajectory class (6.6 percent) includes individuals who have a relatively low religious importance at baseline, and then experience a steady increase throughout adolescence until approximately the age of 20-22 when religious importance starts to decline. The *stable low* growth trajectory class (16.9 percent) includes individuals who believe religion is not too or not at all important and maintain their belief at this low level over time.

Trajectories from the seven-group model for the older cohort group are displayed in Figure 4.4. The *stable high* growth trajectory class (18 percent) includes individuals who believe that religion is extremely important in their life and their belief sustains at a pretty high level over time. The *late declining* growth trajectory class (5.8 percent) includes individuals who believe religion is pretty important until the age of 19-21 before experiencing a gradual decline (to think religion is not too important) throughout the remainder of the observed life course. The *medium declining* growth trajectory class (23.4 percent) includes individuals whose beliefs in religion experience a slight decline from



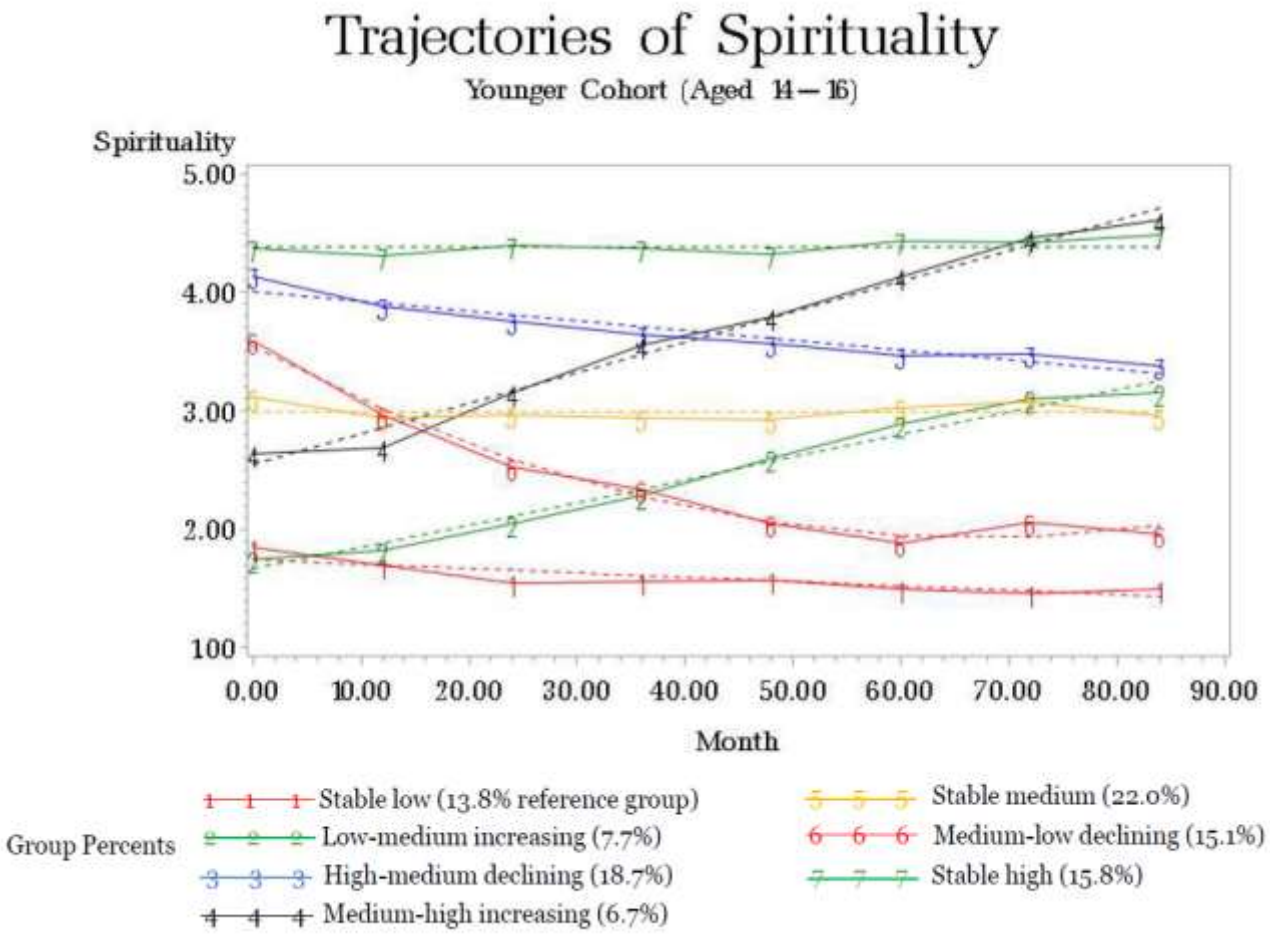
Notes: Expected (dashed lines) Versus Observed (solid line) Trajectories

Figure 4.4: Trajectories of Religious Importance for the Older Cohort Group

somewhat important to not too important. The *stable medium* growth trajectory class (21.8 percent) includes individuals who believe religion is somewhat or pretty important over their life course. The *early increasing* growth trajectory class (9.5 percent) includes individuals who have a relatively medium religious importance at baseline, and then experience a steady increase throughout young adulthood until approximately the age of 21-24 when religious importance remains relatively high. The *gradual increasing* growth trajectory class (7.9 percent) includes individuals whose religious importance gradually increases from "not too important" to "very important". The *stable low* growth trajectory class (13.6 percent) includes individuals who believe religion is not too or not at all important. This class also exhibits a slight decrease from not too important to not at all important.

Trajectories of Spirituality

Trajectories from the seven-group model for the younger cohort group are displayed in Figure 4.5. The *stable high* growth trajectory class (15.8 percent) includes individuals who sustain high spirituality over the observed life course. The *stable medium* growth trajectory class (22 percent) includes individuals who tend to have stable and medium levels of spirituality over the observed life course. The *stable low* growth trajectory class (13.8 percent) includes individuals who tend to have stable and low levels of spirituality over the observed life course. The *high-medium declining* growth trajectory class (18.7 percent) includes individuals whose spirituality decreases from high levels to medium levels gradually. The *medium-low declining* growth trajectory class (15.1 percent) includes individuals who have medium or high levels of spirituality at baseline and then experience a steady decrease into low levels of spirituality. The *low-medium increasing*

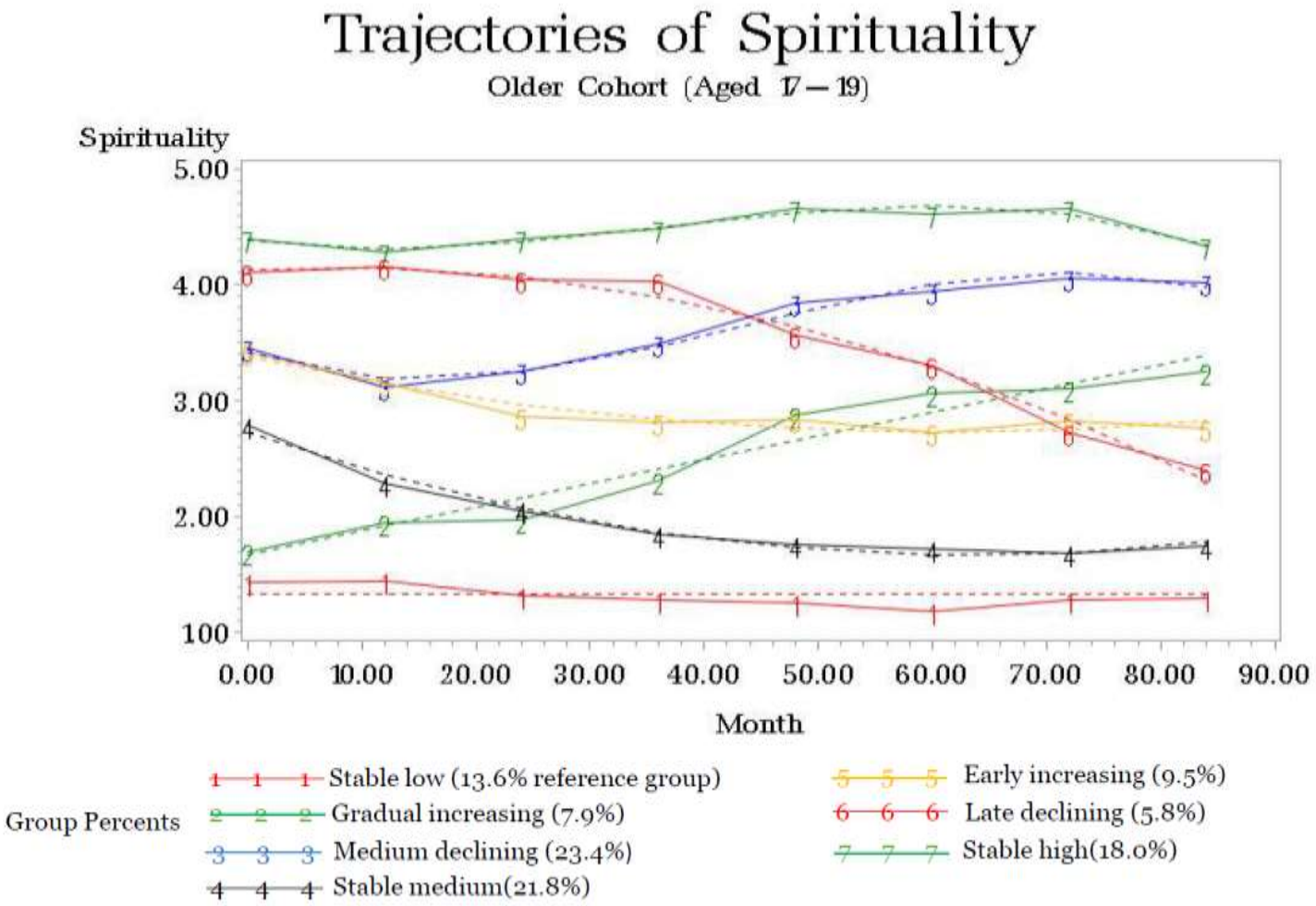


Notes: Expected (dashed lines) Versus Observed (solid line) Trajectories

Figure 4.5: Trajectories of Spirituality for the Younger Cohort Group

growth trajectory class (7.7 percent) includes individuals who tend to have low levels of spirituality at baseline and then experience a steady increase into medium levels of spirituality. The *medium-high increasing* growth trajectory class (6.7 percent) includes individuals who tend to have medium levels of spirituality at baseline and then experience a steady increase into higher levels of spirituality.

Trajectories from the seven-group model for the older cohort group are displayed in Figure 4.6. The *stable high* growth trajectory class (20.8 percent) includes individuals who tend to be highly spiritual over the observed life course even though they experience slight variations. The *stable low* growth trajectory class (7.1 percent) includes individuals who tend to have stable and low levels of spirituality over the observed life course. The *high-medium declining* growth trajectory class (7.7 percent) includes individuals whose spirituality stays stable high until the age of 21-23 before experiencing a gradual decline into medium or low levels throughout the rest of the observed life course. The *medium declining* growth trajectory class (21.9 percent) includes individuals who tend to experience a slight decrease within medium levels of spirituality in the first two interview years and remain relatively stable throughout the remainder of the observed life course. The *medium-low declining* growth trajectory class (14.7 percent) includes individuals who tend to have medium levels of spirituality at baseline and then experience a steady decrease into low levels of spirituality. The *low-medium increasing* growth trajectory class (8.6 percent) includes individuals who tend to have low levels of spirituality at baseline and then experience a steady increase into medium levels of spirituality. The *medium-high increasing* growth trajectory class (19.4 percent) includes individuals who tend to have medium levels of spirituality at baseline and then experience a steady increase into high.



Notes: Expected (dashed lines) Versus Observed (solid line) Trajectories

Figure 4.6: Trajectories of Spirituality for the Older Cohort Group

levels of spirituality, though they have a slight decrease within the first interview year.

4.3 GROWTH CURVE MODELS

This stage of analysis focuses on investigating whether changes in religiosity over time are related to changes in criminal behavior. GCMs including unconditional GCMs and multiple-group GCMs are conducted for this purpose.

4.3.1 Unconditional Growth Curve Models

The results regarding unconditional GCMs are shown in Appendix C. Table C.1 shows fit statistics of both linear and quadratic growth curve models of each substance use and criminal behavior for the younger cohort and older cohort group respectively. Table C.2 shows the results of latent growth curve factors in the unconditional GCMs: intercept, linear, and quadratic components.

Criminal Behavior

With respect to criminal behavior, chi-square difference tests and BIC are used to assess improvement in fit of quadratic models over linear models. In both the younger and older cohort groups, the quadratic models result in a significant improvement in chi-square and smaller BIC. In addition, parameters on means and variances of three latent growth curve factors are all statistically significant. All types of self-reported offending (i.e., aggressive offending, income-related offending, and total offending follow the similar trajectory pattern for both cohort groups. To be more specific, the mean linear slope is negative and the mean quadratic slope is positive. These indicate that all types of self-reported offending follow the trajectory of an initial decrease and a subsequent increase (acceleration). However, compared with self-reported offending, official arrest shows a different trajectory pattern. For both cohort groups, the mean linear slope is positive and

the mean quadratic slope is negative, indicating an initial increase and a subsequent decrease (deceleration) of the average trajectory of official arrest. In addition, significant variances of initial level, linear slope and quadratic slope for both self-reported offending and official arrest (except for the initial level of variance regarding the quadratic model of income-related offending and official arrest in the older cohort group) indicate that the shape and rate of linear and nonlinear change significantly vary across individuals.

Substance Use

Given the types of substance use, the results of unconditional GCMs are relatively complex. With respect to the individual fit indices for linear and quadratic models, values on the TLI and CFI are very close to the ideal value of one and values on the RMSEA and SRMR values are generally more than .05 and less than .10 (including SRMR=.036 for the quadratic model of cigarette smoking), indicating that all models fit the data quite well. Regardless of the outcome measures, BIC values favor the quadratic models over the linear models, except for the quadratic model of hard drug use for the younger cohort group. On the face of fit indices, the fit differences between the linear and quadratic growth curve models are minimal, with both models providing a relatively equivalent fit for substance use for both cohort groups. However, chi-square difference tests comparing linear models to quadratic models are all statistically significant. It seems that quadratic growth curve models best represent the shape of the developmental trajectory of juvenile progression in different types of substance use from late adolescence to adulthood. Yet, the results of growth factors seem to not quite support quadratic models.

To be more specific, regarding alcohol use, chi-square difference tests and other fit statistics show that the quadratic model fits better than the linear model, even though the

mean of the linear slope is not significant. For both cohort groups, the means of both the initial level and quadratic slope are significant and positive, indicating that alcohol use shows a significant upward trend and varies widely in the initial levels. Similarly, a better fit of the quadratic model than the linear model is found for cigarette smoking. Overall, adolescents vary widely in their initial levels of cigarette smoking in both cohort groups. The growth pattern of cigarette smoking in the younger cohort group is a little bit different from that in the older cohort group. Specifically, cigarette smoking of the younger cohort group shows an initial linear increase and a deceleration to no change over time, since the mean for the quadratic slope is nonsignificant. However, cigarette smoking of the older cohort group shows an initial linear increase and a subsequent decrease (deceleration) over time.

With respect to marijuana use, except for chi-square difference tests, other fit statistics do not show that the quadratic model provides a significantly better fit than the linear model in the younger cohort group. In addition, given the nonsignificant means of the linear and quadratic slope factor in the quadratic model, the linear model is determined to be the most appropriate model. Give that the mean of the linear slope is nearly positively significant, marijuana use in the younger cohort group increases slightly, but non-significantly over time. However, the results regarding marijuana use of the older cohort group are quite different. Chi-square difference tests and other fit statistics show a better fit of the quadratic model than the linear model. Additionally, the significant negative linear slope mean and the positive quadratic slope mean reflect that marijuana use in the older cohort group follows an initial linear decrease and then a significant acceleration trend over time.

With hard drug use in both the younger and older cohort groups, chi-square difference tests show that the quadratic model results in a significant improvement in chi-square over the linear model. Nevertheless, the BIC value does not show a significantly better fit for the quadratic model than the linear model. In addition, the means of the linear and quadratic slope are nonsignificant in the quadratic model. Thus, the linear model is determined to be the most appropriate model. In the linear models, the means for the linear slopes are significant in both cohort groups, indicating that hard drug use declines significantly over time.

Unlike the mean growth parameters, variances of all types of substance use are more consistent. The results show that significant variances exist in the initial level, linear slope and quadratic slope for all types of substance use. This indicates that the shape and rate of linear and nonlinear change significantly vary across individuals, suggesting a need for considering characteristics, such as adolescent religiosity, to account for the variability among individuals.

4.3.2 Multiple-Group Growth Curve Models[6]

As discussed above, the growth pattern of each substance use and criminal behavior is determined in the unconditional models and sufficient variability is found in the intercept

[6] The findings of multiple-group GCMs with control variables are reported. The results of multiple-group GCMs without control variables are available upon request. Overall, the results regarding the growth slopes (including linear and quadratic slope) of substance use and criminal behavior are substantively similar to those reported with a few exceptions. The significant differences reside in the initial levels (i.e., intercept) of substance use and criminal behavior, such that several significant estimates become insignificant after including relevant control variables. This may be because of the sample of adjudicated adolescents used. In addition to religiosity, the initial levels of crime are affected by other relevant factors, which exhibit greater effects on the risk of engagement in crime. Nevertheless, subsequent changes in criminal behavior are less likely to be due to preexisting family, social, and opportunity factors, when investigating a sample of adolescents who have previously committed serious offenses (Pirutinsky, 2014). As such, it makes sense that there are no significant changes with respect to the growth slopes of crime after including relevant theoretical variables. This data can explicitly test whether within-individual changes in religiosity are related to criminal trajectories.

and slopes. Based on the unconditional GCMs, conditional models—multiple-group GCMs are estimated, in which group trajectory membership of each dimension of religiosity is used to predict differences in the intercept and slopes of each substance use and criminal behavior respectively. A series of separate models are conducted for both younger and older cohort groups. As such, forty-eight separate models are estimated. Table 4.1-4.3 provide summaries of the model estimates for each multiple-group GCM.

Models of Aggressive Offending

The multiple-group GCM of each dimension of religiosity and self-reported aggressive offending with a quadratic function is estimated in both cohort groups respectively. As discussed above, the growth of aggressive offending follows the trajectory exhibiting an initial decrease and a subsequent acceleration (upward) for both cohort groups.

Religious Attendance

With respect to religious attendance, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant in the younger cohort group. The results indicate that there are no significant differences across trajectory groups of religious attendance regarding the initial level and the rate of change in the likelihood of engaging in self-reported aggressive offending.

Regarding the older cohort group, the coefficient estimate of the linear slope for *late increasing attenders* is marginally significant and positive, indicating that *late increasing attenders* experience a greater rate of decrease in the likelihood of being involved in aggressive offending over time, compared to *non-attenders.* Although *late increasing attenders* have a relatively low frequency of religious participation at the

Table 4.1. Religious Attendance Trajectory Group Differences in Growth Trajectory Estimates

	Criminal Behavior				Substance Use			
Religious Attendance Trajectories	Aggressive offending	Income-related offending	Self-reported offending	Official arrest	Alcohol use	Cigarette smoking	Marijuana use	Hard drug use
Younger cohort Group (aged 14-16)								
Intercept								
Gradual increasing attenders	-.904	-.342	-.779	.328	-.192	1.087*	.184	.813
	(.569)	(.613)	(.699)	(.761)	(.229)	(.503)	(.314)	(.503)
Late increasing attenders	.633	.245	.732	-.194	-.235	.144	-.027	-.363
	(.616)	(.306)	(.709)	(.505)	(.195)	(.425)	(.287)	(.435)
Parabolic attenders	.145	.629	1.035	-.050	-.113	-.467	-.205	-.939*
	(.648)	(.573)	(.727)	(.482)	(.204)	(.428)	(.255)	(.459)
Early declining attenders	-.339	-.477	-.097	.645	-.343+	-.302	-.389*	-1.047**
	(.471)	(.394)	(.488)	(.414)	(.185)	(.320)	(.193)	(.334)
Frequent attenders	-.268	.707	.325	-.708	-.249	-.228	-.350	-.804+
	(.610)	(.542)	(.639)	(.547)	(.245)	(.349)	(.223)	(.470)
Gradual declining attenders	.126	-.422	.142	.326	-.259	-.034	-.379*	-.637+
	(.555)	(.411)	(.590)	(.394)	(.204)	(.345)	(.187)	(.379)
Linear Slope								
Gradual increasing attenders	.332	-.014	.263	.284	-.078	-.787**	-.023	-.162
	(.335)	(.334)	(.410)	(.445)	(.155)	(.279)	(.075)	(.156)
Late increasing attenders	-.178	-.289	-.218	.805**	.289	-.195	.076	.125
	(.325)	(.320)	(.386)	(.294)	(.201)	(.201)	(.065)	(.103)
Parabolic attenders	-.109	-.242	-.626	-.052	.038	-.142	-.002	.107
	(.357)	(.359)	(.393)	(.377)	(.129)	(.234)	(.065)	(.119)
Early declining attenders	.085	-.141	-.121	-.669*	.116	-.101	.082	.205
	(.281)	(.259)	(.264)	(.291)	(.117)	(.175)	(.051)	(.178)
Frequent attenders	.033	-.445	-.317	.087	-.030	-.541**	.029	.068
	(.369)	(.350)	(.354)	(.317)	(.139)	(.210)	(.053)	(.106)
Gradual declining attenders	.184	.172	.097	-.270	.047	-.133	.079	.094
	(.287)	(.269)	(.304)	(.289)	(.134)	(.180)	(.050)	(.090)
Quadratic Slope								
Gradual increasing attenders	-.019	.004	-.024	-.062	.016	.104**		
	(.042)	(.046)	(.050)	(.060)	(.022)	(.039)		
Late increasing attenders	.035	.030	.035	-.125**	-.026	.017		

	(.040)	(.041)	(.047)	(.041)	(.016)	(.031)		
Parabolic attenders	.036	.025	.085	.004	-.009	.010		
	(.043)	(.046)	(.055)	(.056)	(.019)	(.030)		
Early declining attenders	-.001	.041	.021	.081*	-.018	.010		
	(.034)	(.034)	(.031)	(.039)	(.016)	(.024)		
Frequent attenders	.004	.042	.038	.004	.004	.086**		
	(.048)	(.047)	(.045)	(.040)	(.020)	(.028)		
Gradual declining attenders	-.019	-.022	-.013	.027	-.002	.011		
	(.034)	(.037)	(.035)	(.040)	(.017)	(.024)		
Older cohort Group (aged 17-19)								
Intercept								
Declining-increasing-declining attenders	.621	.581	.824	-.264	-.331	-.149	-.255	.468
	(.795)	(1.154)	(.849)	(.831)	(.288)	(.547)	(.436)	(.527)
Parabolic attenders	.667	-4.489*	.567	-.818	-.196	.572	-.106	.148
	(1.023)	(2.210)	(.994)	(.836)	(.333)	(.629)	(.483)	(.577)
Late increasing attenders	-.334	-.376	-.461	.324	.175	-.448	1.251***	1.011**
	(1.107)	(1.137)	(.678)	(.625)	(.297)	(.505)	(.385)	(.391)
Early declining attenders	-.559	-1.486	-.951^{+}	.684	-.298	-.486	-.177	.434
	(.478)	(1.106)	(.546)	(.579)	(.234)	(.430)	(.325)	(.354)
Increasing-declining-increasing attenders	-.475	-.296	.019	-1.181	-.045	.719	-.047	.594
	(1.191)	(1.404)	(.959)	(1.864)	(.470)	(.654)	(.549)	(.509)
Frequent attenders	.156	1.259	-.082	.306	-.378	-1.109*	.040	.005
	(.697)	(1.342)	(.736)	(.784)	(.301)	(.531)	(.425)	(.472)
Linear Slope								
Declining-increasing-declining attenders	-.004	-.430	-.236	.965*	.302	-.484	.227	-.026
	(.418)	(.761)	(.555)	(.501)	(.213)	(.314)	(.253)	(.141)
Parabolic attenders	-.393	2.868*	-.456	.869	.057	-.319	-.031	-.146
	(.609)	(1.360)	(.551)	(.615)	(.201)	(.382)	(.279)	(.193)
Late increasing attenders	.582^{+}	-.817	.184	.262	-.223	.010	-.927***	-.145
	(.315)	(.669)	(.431)	(.473)	(.185)	(.223)	(.221)	(.109)
Early declining attenders	.527^{+}	.224	.695*	-.244	.241^{+}	.047	.335^{+}	-.116
	(.288)	(.620)	(.315)	(.399)	(.139)	(.240)	(.186)	(.112)
Increasing-declining-increasing attenders	.638	.015	.233	-.468	-.180	-.571*	-.159	-.073
	(.616)	(1.101)	(.516)	(.995)	(.294)	(.261)	(.324)	(.144)
Frequent attenders	.266	-2.078*	.035	-.341	.159	.051	-.186	-.188
	(.436)	(.854)	(.492)	(.563)	(.199)	(.351)	(.248)	(.162)

Quadratic Slope							
Declining-increasing-declining attenders	.003	.080	.041	-.158**	-.043	.042	-.030
	(.054)	(.112)	(.073)	(.062)	(.030)	(.041)	(.034)
Parabolic attenders	.030	-.474*	.039	-.109	-.004	.039	-.006
	(.078)	(.217)	(.064)	(.092)	(.027)	(.053)	(.037)
Late increasing attenders	-.065	.146	-.012	-.047	.043^{+}	.016	.107***
	(.042)	(.095)	(.056)	(.067)	(.024)	(.032)	(.029)
Early declining attenders	-.066^{+}	.011	-.077^{+}	.045	-.030	-.006	-.042^{+}
	(.039)	(.081)	(.040)	(.056)	(.019)	(.032)	(.024)
Increasing-declining-increasing attenders	-.092	-.048	-.058	.083	.033	.086*	.024
	(.078)	(.152)	(.067)	(.097)	(.037)	(.039)	(.043)
Frequent attenders	-.045	.286**	.006	.015	-.018	.002	.017
	(.055)	(.109)	(.064)	(.084)	(.025)	(.050)	(.032)

Notes: Unstandardized coefficients are reported. Values in parentheses represent the standard errors. All models reported include controls for the time-variant and time-invariant variables noted in Table 1. Reference group is *non-attenders*.

***p≤ 0.001, **p≤ 0.01, *p≤ 0.05, $^{+}$p<0.1 (two-tailed)

Table 4.2. Religious Importance Trajectory Group Differences in Growth Trajectory Estimates

	Criminal Behavior				Substance Use			
Religious importance trajectories	Aggressive offending	Income-related offending	Self-reported offending	Official arrest	Alcohol use	Cigarette smoking	Marijuana use	Hard drug use
Younger cohort Group (aged 14-16)								
Intercept								
Medium increasing	-.007	-.177	.081	.432	.065	-.006	-.103	.440
	(.639)	(.418)	(.569)	(.282)	(.216)	(.342)	(.225)	(.315)
Gradual increasing	-1.115	-.513	-.824	.440	.052	-.184	-.369	.347
	(.927)	(.583)	(.851)	(.383)	(.261)	(.496)	(.313)	(.462)
Gradual declining	-.890	-.822^{+}	-.866	.250	-.043	-.256	-.557*	-.109
	(.788)	(.471)	(.640)	(.317)	(.251)	(.384)	(.256)	(.370)
Late declining	-1.356	-.484	-.267	-.257	-.275	.126	.043	.677
	(.874)	(.552)	(.727)	(.394)	(.236)	(.451)	(.343)	(.477)
Declining/increasing	-.264	-.323	-.368	.320	-.036	-.304	-.330	.201
	(.649)	(.474)	(.566)	(.329)	(.224)	(.382)	(.244)	(.394)
Stable high	.109	-.514	.442	.446	.150	.277	-.002	.124
	(.746)	(.452)	(.575)	(.307)	(.220)	(.364)	(.254)	(.364)
Linear Slope								
Medium increasing	-.007	.022	-.033	-.168	.071	-.144	.039	-.073
	(.363)	(.259)	(.307)	(.190)	(.132)	(.189)	(.052)	(.081)
Gradual increasing	.525	.025	.506	.017	-.162	-.309	.033	-.098
	(.494)	(.358)	(.451)	(.269)	(.159)	(.267)	(.070)	(.104)
Gradual declining	.644	.170	.419	-.260	-.097	.142	.156**	-.017
	(.416)	(.307)	(.338)	(.239)	(.162)	(.206)	(.060)	(.093)
Late declining	.820^{+}	.537	.327	.166	.068	-.111	-.042	-.272*
	(.482)	(.353)	(.395)	(.262)	(.147)	(.227)	(.070)	(.129)
Declining-increasing	.344	.261	.384	-.098	.018	-.085	.091	-.065
	(.363)	(.302)	(.312)	(.217)	(.141)	(.210)	(.056)	(.094)
Stable high	.190	.141	-.165	-.311	-.096	-.602**	.022	-.036
	(.395)	(.291)	(.311)	(.205)	(.138)	(.199)	(.056)	(.090)
Quadratic Slope								
Medium increasing	-.005	-.003	.003	.016	-.014	.031		
	(.044)	(.034)	(.037)	(.026)	(.018)	(.026)		
Gradual increasing	-.051	-.004	-.061	-.012	.021	.049		

	(.059)	(.049)	(.053)	(.039)	(.023)	(.035)		
Gradual declining	-.069	-.001	-.042	.023	.009	-.015		
	(.05)	(.041)	(.040)	(.033)	(.022)	(.029)		
Late declining	-.107^{+}	-.098*	-.058	-.020	-.019	.016		
	(.061)	(.048)	(.048)	(.036)	(.020)	(.031)		
Declining-increasing	-.037	-.036	-.046	.012	-.007	.016		
	(.045)	(.040)	(.038)	(.029)	(.019)	(.028)		
Stable high	-.037	-.011	.021	.033	.005	.082**		
	(.048)	(.039)	(.038)	(.029)	(.019)	(.027)		
Older cohort Group (aged 17-19)								
Intercept								
Gradual increasing	.255	.646	-.263	1.577*	.409	.256	.622	-.159
	(.715)	(.886)	(.827)	(.700)	(.388)	(.680)	(.517)	(.579)
Medium declining	-.835	-.119	-.643	.873	.193	-.203	.160	.468
	(.608)	(.685)	(.727)	(.543)	(.290)	(.489)	(.381)	(.393)
Stable medium	-.676	-.364	-.173	.841	-.042	.003	.242	-.145
	(.600)	(.659)	(.674)	(.638)	(.281)	(.488)	(.385)	(.412)
Early increasing	.208	-1.159	.260	.841	-.080	.394	.603	.322
	(.755)	(.883)	(.809)	(.638)	(.358)	(.651)	(.486)	(.517)
Late declining	-.524	-2.597^{+}	-1.584	-.530	-.906*	.100	-.783	.057
	(1.197)	(1.425)	(1.183)	(1.267)	(.436)	(.767)	(.609)	(.669)
Stable high	-.096	-.309	-.061	1.238	-.054	-.190	.115	-.288
	(.660)	(.742)	(.727)	(.836)	(.298)	(.531)	(.422)	(.465)
Linear Slope								
Gradual increasing	-.270	-.773	-.129	-.470	-.009	-.223	-.220	-.129
	(.462)	(.545)	(.527)	(.687)	(.239)	(.332)	(.303)	(.176)
Medium declining	.020	-.204	-.229	-1.317*	.105	.275	.264	-.206^{+}
	(.358)	(.405)	(.435)	(.541)	(.184)	(.229)	(.224)	(.107)
Stable medium	.053	.024	-.297	-1.185*	.070	-.153	-.076	-.104
	(.346)	(.401)	(.418)	(.489)	(.187)	(.229)	(.228)	(.117)
Early increasing	-.299	.551	-.519	-1.020	.172	-.625^{+}	-.161	-.121
	(.425)	(.568)	(.526)	(.664)	(.236)	(.322)	(.286)	(.158)
Late declining	-.247	.965	.330	.792	.339	.004	.385	-.310
	(.760)	(.810)	(.671)	(.969)	(.287)	(.435)	(.352)	(.201)
Stable high	.157	-.336	-.284	-1.209*	.168	-.178	.109	-.047
	(.410)	(.447)	(.454)	(.560)	(.197)	(.269)	(.250)	(.133)

Quadratic Slope							
Gradual increasing	.050	.100	.033	.044	-.004	.030	.014
	(.064)	(.074)	(.071)	(.089)	(.033)	(.044)	(.040)
Medium declining	.032	.029	.059	.195**	-.016	-.034	-.043
	(.046)	(.053)	(.054)	(.073)	(.026)	(.030)	(.029)
Stable medium	.008	-.013	.038	.186**	-.009	.023	-.002
	(.046)	(.055)	(.054)	(.069)	(.026)	(.030)	(.030)
Early increasing	.056	-.069	.087	.077	-.027	.084*	.009
	(.054)	(.075)	(.067)	(.053)	(.031)	(.042)	(.037)
Late declining	.043	-.124	-.024	-.108	-.023	.024	-.052
	(.095)	(.108)	(.076)	(.138)	(.035)	(.057)	(.045)
Stable high	-.024	.058	.043	.194*	-.020	.026	-.022
	(.054)	(.059)	(.058)	(.076)	(.027)	(.037)	(.033)

Notes: Unstandardized coefficients are reported. Values in parentheses represent the standard errors. All models reported include controls for the time-variant and time-invariant variables noted in Table 1. Reference group is *stable low*.

***p≤ 0.001, **p≤ 0.01, *p≤ 0.05, $^{+}$p<0.1 (two-tailed)

Table 4.3. Spirituality Trajectory Group Differences in Growth Trajectory Estimates

	Criminal behavior				Substance use			
Spirituality trajectories	Aggressive offending	Income-related offending	Self-reported offending	Official arrest	Alcohol use	Cigarette smoking	Marijuana use	Hard drug use
Younger cohort group (aged 14-16)								
Intercept								
Low-medium increasing	.002	.135	.416	.084	.087	-.042	.198	.529
	(.770)	(.579)	(.850)	(.375)	(.316)	(.489)	(.303)	(.458)
High-medium declining	-.529	-.249	-.139	-.245	-.084	.311	-.075	.034
	(.583)	(.478)	(.604)	(.335)	(.238)	(.399)	(.268)	(.392)
Medium-high increasing	.472	-.096	1.045	-.101	-.119	1.069	.260	.184
	(.757)	(.644)	(.766)	(.428)	(.276)	(.687)	(.338)	(.506)
Stable medium	-.353	-.133	-.061	-.211	-.132	-.206	.085	.421
	(.576)	(.449)	(.591)	(.303)	(.235)	(.369)	(.249)	(.337)
Medium-low declining	-.407	.136	-.165	-.108	-.234	-.121	-.301	.487
	(.603)	(.445)	(.628)	(.311)	(.245)	(.400)	(.246)	(.358)
Stable high	-.177	-.227	.500	.169	.067	.237	-.016	.220
	(.626)	(.515)	(.654)	(.334)	(.257)	(.419)	(.280)	(.434)
Linear Slope								
Low-medium increasing	-.061	-.235	-.419	-.032	.083	-.066	-.039	-.072
	(.43)	(.348)	(.447)	(.263)	(.182)	(.280)	(.069)	(.105)
High-medium declining	.363	.266	.215	.193	-.090	-.413	.018	-.025
	(.322)	(.304)	(.328)	(.226)	(.142)	(.268)	(.061)	(.096)
Medium-high increasing	-.022	.029	-.447	.081	.059	-.734**	-.035	-.096
	(.432)	(.402)	(.416)	(.290)	(.200)	(.276)	(.086)	(.119)
Stable medium	.243	.141	.149	.123	-.043	-.120	.024	-.097
	(.320)	(.280)	(.319)	(.207)	(.138)	(.196)	(.055)	(.083)
Medium-low declining	.185	-.272	-.038	-.087	-.152	-.154	-.006	-.170+
	(.334)	(.285)	(.339)	(.221)	(.142)	(.200)	(.055)	(.090)
Stable high	.151	.013	-.311	-.297	-.164	-.658**	.002	-.081
	(.350)	(.317)	(.357)	(.234)	(.153)	(.223)	(.064)	(.108)
Quadratic Slope								
Low-medium increasing	.002	.021	.049	-.003	-.019	.019		
	(.053)	(.045)	(.053)	(.037)	(.025)	(.041)		
High-medium declining	-.042	-.060	-.039	-.023	.001	.052		

	(.040)	(.041)	(.040)	(.031)	(.019)	(.036)		
Medium-high increasing	-.005	-.033	.032	-.013	-.020	.083*		
	(.054)	(.054)	(.051)	(.04)	(.027)	(.036)		
Stable medium	-.034	-.027	-.030	-.007	-.001	.029		
	(.039)	(.037)	(.038)	(.028)	(.018)	(.026)		
Medium-low declining	-.022	.024	.001	.009	.016	.027		
	(.040)	(.038)	(.041)	(.031)	(.020)	(.027)		
Stable high	-.022	-.011	.027	.043	.008	.097***		
	(.043)	(.043)	(.044)	(.032)	(.021)	(.030)		
Older cohort group (aged 17-19)								
Intercept								
Low-medium increasing	1.132	-.571	1.357	.713	.351	-.307	.379	-.229
	(.972)	(1.166)	(1.028)	(.809)	(.382)	(.742)	(.587)	(.631)
Medium-high increasing	-.003	-.722	.025	1.533*	.313	-.195	.154	.274
	(.747)	(1.041)	(.873)	(.699)	(.324)	(.624)	(.511)	(.576)
Medium-low declining	1.015	-.726	.403	1.421	.397	.545	-.126	.549
	(.786)	(1.074)	(.919)	(.979)	(.321)	(.641)	(.515)	(.555)
Medium declining	.266	-1.509	-.524	1.153	.380	-.023	-.116	-.072
	(.766)	(1.036)	(.904)	(.968)	(.285)	(.612)	(.500)	(.550)
High-medium declining	.655	-2.946*	-.347	1.247	-.407	-.118	-1.224^{+}	.300
	(1.072)	(1.445)	(1.184)	(.861)	(.413)	(.772)	(.639)	(.664)
Stable high	.677	-2.005^{+}	-.032	.882	.054	-.140	-.252	-.224
	(.785)	(1.092)	(.893)	(.712)	(.297)	(.647)	(.520)	(.599)
Linear Slope								
Low-medium increasing	-1.026*	-.288	-1.640*	-.333	.125	.008	-.059	-.022
	(.518)	(.693)	(.646)	(.462)	(.246)	(.330)	(.346)	(.195)
Medium-high increasing	-.664	-.216	-.763	-.751	-.030	-.011	.216	-.190
	(.422)	(.568)	(.568)	(.724)	(.209)	(.273)	(.300)	(.160)
Medium-low declining	-1.206**	-.086	-.921	-.865	.136	.179	.482	-.098
	(.449)	(.568)	(.588)	(.657)	(.217)	(.270)	(.376)	(.146)
Medium declining	-.914*	.298	-.410	-.669	-.146	.280	.304	-.045
	(.428)	(.568)	(.570)	(.408)	(.194)	(.268)	(.294)	(.154)
High-medium declining	-1.227*	.685	-.678	-.825	.144	.435	.613	-.469*
	(.585)	(.823)	(.703)	(.517)	(.283)	(.427)	(.376)	(.212)
Stable high	-.730	.307	-.657	-.668	.045	.002	.355	.029
	(.464)	(.614)	(.574)	(.421)	(.210)	(.300)	(.308)	(.161)

Quadratic Slope							
Low-medium increasing	.162*	.062	.256**	.061	-.023	-.010	-.002
	(.066)	(.090)	(.086)	(.060)	(.036)	(.045)	(.045)
Medium-high increasing	.114*	.044	.128^{+}	.098	-.009	.002	-.051
	(.056)	(.069)	(.075)	(.091)	(.031)	(.035)	(.039)
Medium-low declining	.187***	.028	.169*	.078	-.025	-.024	-.085*
	(.059)	(.070)	(.078)	(.140)	(.033)	(.034)	(.039)
Medium declining	.155**	-.009	.098	.087	.018	-.027	-.045
	(.055)	(.070)	(.074)	(.053)	(.030)	(.034)	(.038)
High-medium declining	.190**	-.053	.126	.100	-.022	-.044	-.077
	(.076)	(.101)	(.088)	(.090)	(.039)	(.058)	(.049)
Stable high	.023	-.005	.115	.081	-.002	.011	-.050
	(.085)	(.077)	(.075)	(.055)	(.031)	(.040)	(.040)

Notes: Unstandardized coefficients are reported. Values in parentheses represent the standard errors. All models reported include controls for the time-variant and time-invariant variables noted in Table 1. Reference group is *stable low*.

***p≤ 0.001, **p≤ 0.01, *p≤ 0.05, $^{+}$p<0.1 (two-tailed)

beginning of the observed life course, they experience a steady increase after the age of 21-23. Thus, people with an increasing frequency of religious attendance over time decrease the odds of engaging in aggressive offenses more so than those who maintain a low frequency of religious attendance. With respect to the trajectory group of early declining attenders, it is marginally and positively related to the linear slope and negatively associated with the quadratic slope, indicating a greater initial rate of decrease and a subsequent quicker acceleration in the likelihood of engaging in aggressive offenses. *Early declining attenders* attend religious services at a relatively high frequency at baseline (aged 17-19), but experience a rapid decline in religious attendance one year later (aged 18-20). Accordingly, the odds of aggressive offending initially decease more and then accelerate quicker among individuals who possess an initial high and overall decrease in the frequency of religious attendance.

Religious Importance

As with religious importance in the younger cohort group, the trajectory group of *late declining* is marginally and positively associated with the linear slope of self-reported aggressive offending, indicating that the *late declining* group experiences a greater rate of decrease in the likelihood of being involved in aggressive offending over time, compared to the *stable low* group. This trajectory group is also marginally and negatively associated with the quadratic slope, indicating a quicker acceleration in the likelihood of engaging in aggressive offenses after an initial quicker decrease. As indicated above, individuals in the trajectory group of *late declining* maintain a relatively high level of religious importance in the first four years and then experience a gradual decline. Not surprisingly, the odds of engaging in aggressive offending initially decrease more and then accelerate quicker

among individuals who report an initial high and overall decrease in the levels of religious importance over time.

However, in the older cohort group, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant. These results suggest that there are no significant differences among trajectory groups of religious attendance regarding the initial level and the rate of change in the likelihood of engaging in self-reported aggressive offending.

Spirituality

Given spirituality in the younger cohort group, there are no significant differences across identified trajectory groups regarding the initial level and the rate of change in the likelihood of engaging in self-reported aggressive offending. The results show that the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant.

Regarding the older cohort group, the groups of *low-medium increasing* and *medium-low declining* are associated with the linear slope negatively and the quadratic slope positively, indicating that these trajectory groups experience a smaller rate of initial decrease and a slower subsequent acceleration in the likelihood of engaging in aggressive offenses compared to the group of *stable low*. The trajectory group of *medium-low declining* includes individuals who tend to have medium levels of spirituality at baseline and then experience a steady decrease into low levels of spirituality. Differently, the trajectory group of *low-medium increasing* includes individuals who tend to have low levels of spirituality at baseline and then experience a steady increase into medium levels of spirituality. It should be noted that although the groups of *medium-low declining* and

low-medium increasing exhibit opposite trajectories of spirituality, they show the similar relationship with the growth trajectory of aggressive offending. Overall, the odds of aggressive offending decrease less initially and accelerate slower subsequently among individuals who hold a small range of increase and decrease in spirituality than those who maintain low levels of spirituality over time.

Similarly, the trajectory group of *high-medium declining* experiences a smaller initial decrease and a slower subsequent acceleration in the likelihood of engaging in aggressive offenses compared to the group of *stable low*. In the trajectory group of *high-medium declining*, individuals' spirituality remains stable high until the age of 21-23 before experiencing a gradual decline into medium levels throughout the rest of the observed life course. Given the trajectory shape of *high-medium declining*, the odds of aggressive offending decrease less initially and accelerate slower subsequently among individuals with an overall decrease but higher in spirituality than those who maintain low levels of spirituality over time.

Like the group of *high-medium declining,* the trajectory group of *medium declining* is also associated with the linear slope negatively and the quadratic slope positively, indicating that this trajectory group experiences a smaller rate of initial decrease and a slower subsequent acceleration in the likelihood of engaging in aggressive offenses compared to the group of *stable low*. Individuals in the trajectory group of *medium declining* tend to experience a slight decrease within medium levels of spirituality over the observed life course. Given the trajectory shape of *medium declining*, the odds of aggressive offending decrease less initially and accelerate slower subsequently among individuals with the overall decreased but relatively higher levels of spirituality than those

who maintain low levels of spirituality over time.

In addition, the *medium-high increasing* group is positively associated with the quadratic slope, indicating that this trajectory group experiences a slower acceleration in the likelihood of engaging in aggressive offenses over time. Individuals in the trajectory group of *medium-high increasing* tend to have medium levels of spirituality at baseline and then experience a steady increase into high levels of spirituality. Accordingly, individuals who follow an overall increase in the levels of spirituality experience a slower acceleration in the odds of aggressive offending than those who maintain low levels of spirituality over time.

Income-Related Offending

The multiple-group GCM of each dimension of religiosity and self-reported income-related offending with a quadratic function is estimated in both cohort groups respectively. As discussed above, the growth of income-related offending follows the trajectory exhibiting an initial decrease and a subsequent acceleration (upward) for both cohort groups.

Religious Attendance

With respect to religious attendance in the younger cohort group, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant. That is, there are no significant differences among trajectory groups of religious attendance regarding the initial level and the rate of change in the likelihood of engaging in self-reported income-related offending.

For the older cohort group, the trajectory group of *parabolic attenders* is negatively associated with the initial level of income-related offenses, indicating that *parabolic*

attenders have a relatively lower likelihood of engaging in income-related offenses in the initial level compared to *non-attenders*. Although *parabolic attenders* attend religious service at a somewhat low rate at baseline, they still have a higher frequency of religious attendance relative to *non-attenders*. Thus, it is no surprise that *parabolic attenders* who start with an initial higher frequency of religious attendance have 98.9% lower odds of engaging in income-related offenses than *non-attenders*.

In addition, the estimated linear slope coefficient of *parabolic attenders* is significantly positive, indicating that *parabolic attenders* experience a greater rate of decrease in the likelihood of being involved in income-related offending over time, compared to *non-attenders*. The trajectory group of *parabolic attenders* is also negatively associated with the quadratic slope, indicating a quicker acceleration in the likelihood of engaging in income-related offenses over time. As discussed above, *parabolic attenders* attend religious services at a somewhat low rate at baseline (aged 17-19), increase their participation until approximately the age of 20-22, and then decline throughout the remainder of the observed life course. Accordingly, the odds of engaging in income-related offending decease more initially and accelerate quicker subsequently among individuals who follow an initial increase and a subsequent decrease in the frequency of religious attendance over time than those who maintain a low frequency of religious attendance.

The trajectory group of *frequent attenders* shows a negative coefficient estimate of the linear slope and a positive coefficient estimate of the quadratic slope, which indicate that *frequent attenders* experience a smaller initial decrease and a slower subsequent acceleration in the likelihood of being involved in income-related offenses. Because *frequent attenders* have quite stable and higher levels of religious attendance relative to

non-attenders, it makes sense that these attenders experience a smaller growth rate for both the initial decrease and the subsequent increase.

Religious Importance

Given religious importance in the younger cohort group, the trajectory group of *gradual declining* is marginally and negatively associated with the initial level of income-related offenses, indicating that the *gradual declining* group has a relatively lower likelihood of engaging in income-related offenses in the initial level compared to the group of *stable low*. Given higher initial levels of religious importance relative to the group of *stable low*, individuals in the trajectory group of *gradual declining* thus have 56.1% lower odds of engaging in income-related offenses. In addition, the trajectory group of *late declining* is negatively associated with the quadratic slope, indicating that the *late declining* group experiences a quicker acceleration in the likelihood of engaging in income-related offenses over time. Given the overall decreased levels of religious importance, individuals following the trajectory of *late declining* accelerate the odds of engaging in income-related offending quicker over time than those who maintain low levels of religious importance. Similarly, the *late declining* group is marginally and negatively associated with the initial likelihood of income-related offenses in the older cohort group. This indicates that the trajectory group of *late declining* with an initial higher level of religious importance has 92.6% lower likelihood of engaging in income-related offenses in the initial level compared to the group of *stable low*.

Spirituality

Considering the younger cohort group, there are no significant differences among trajectory groups of spirituality regarding the initial level and the rate of change in the

likelihood of engaging in self-reported income-related offending. However, in the older cohort group, the groups of *high-medium declining* and *stable high* (marginally) are negatively associated with the initial level of income-related offenses, indicating that these groups have a relatively lower likelihood of engaging in income-related offenses in the initial level compared to the *stable low* group. Both trajectory groups tend to have initial higher levels of spirituality relative to the *stable low* group, thus the odds of engaging in income-related offending would be 94.7% lower for the *high-medium declining* group and 86.5% lower for the *stable high* group.

Total Offending

The multiple-group GCM of each dimension of religiosity and self-reported total offending with a quadratic function is estimated in both cohort groups respectively. Like the growth trajectory of self-reported aggressive and income-related offenses, self-reported total offenses follow an initial decrease and a subsequent upward trajectory.

Religious Attendance

As with religious attendance in the younger cohort group, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant. These results show that there are no significant differences among trajectory groups of religious attendance regarding the initial level and the rate of change in the likelihood of engaging in self-reported total offending.

For the older cohort group, the group of *early declining attenders* is marginally and negatively associated with the initial level of total offending, indicating that *early declining attenders* have a relatively lower likelihood of engaging in self-reported total offenses in the initial level compared to *non-attenders*. Given an initial higher frequency of religious

attendance relative to *non-attenders*, *early declining attenders* thus have 61.4% lower odds of engaging in self-reported total offenses.

The trajectory group of *early declining attenders* is positively associated with the linear slope of total offending, indicating that *early declining attenders* decrease the likelihood of being involved in self-reported total offenses at a greater rate over time compared to *non-attenders*. The trajectory group is also negatively associated with the quadratic slope, indicating that *early declining attenders* experience a quicker acceleration in the likelihood of engaging in self-reported total offenses over time. Like the growth of aggressive offending for *early declining attenders*, the growth of self-reported total offending coincides with the trajectory of *early declining attenders*. That is, the odds of engaging in total offending initially decease more and then accelerate upward quicker among individuals who experience an initial higher and overall decreased frequency of religious attendance over time.

Religious Importance

The coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant in both cohort groups, indicating that there are no significant differences among trajectory groups of religious importance regarding the initial level and the rate of change in the likelihood of engaging in total offending.

Spirituality

For the younger cohort group, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant, indicating that there are no significant differences among trajectory groups of spirituality regarding the initial level and the rate of change in the likelihood of engaging in self-reported total offending.

Considering the older cohort group, the group of *low-medium increasing* is negatively associated with the linear slope of self-reported total offenses, indicating that the group of *low-medium increasing* decreases the likelihood of being involved in self-reported total offenses at a slower rate over time compared to that of *stable low*. In addition, the *low-medium increasing* group is positively associated with the quadratic slope, indicating that the trajectory group experiences a slower acceleration in the likelihood of engaging in self-reported total offenses over time than the group of *stable low*. As indicated, individuals in the trajectory group of *low-medium increasing* tend to have low levels of spirituality at baseline and then experience a steady increase into medium levels of spirituality. Not surprisingly, the odds of engaging in total offending decrease less initially and accelerate slower subsequently among individuals who have an initial low but overall increase of spirituality than those who maintain low levels of spirituality over time.

In addition to the group of *low-medium increasing*, the *medium-high increasing* group is marginally and positively associated with the quadratic slope, indicating that it experiences a slower acceleration in the likelihood of engaging in self-reported total offenses over time than the group of *stable low*. As discussed above, individuals in the trajectory group of *medium-high increasing* tend to have medium levels of spirituality at baseline and then experience a steady increase into high levels of spirituality. Given the trajectory of *medium-high increasing*, individuals who follow the overall increased levels of spirituality would experience a slower acceleration in the odds of total offending than those who maintain low levels of spirituality over time.

Similarly, the quadratic slope of *medium-low declining* is significantly positive, indicating a slower acceleration in the likelihood of engaging in self-reported total offenses

over time than the group of *stable low*. It is interesting that individuals in the trajectory groups of *low-medium increasing* and *medium-low declining* exhibit a similar growth pattern of self-reported total offending, even though these two groups of spirituality show quite opposite growth trajectories. This may be explained by the fact that individuals in the two trajectory groups hold an overall higher level of spirituality than those who sustain low levels of spirituality over time.

Official Arrest

The multiple-group GCM of each dimension of religiosity and official arrest with a quadratic function is estimated in both cohort groups respectively. Given the growth of official arrest, it follows an initial increase and a subsequent deceleration (downward) trajectory for both cohort groups.

Religious Attendance

Given religious attendance in the younger cohort group, the trajectory group of *late increasing attenders* is positively associated with the linear slope of official arrest, indicating that these attenders increase the likelihood of official arrest at a greater rate over time compared to *non-attenders*. In addition, this trajectory group is negatively associated with the quadratic slope, indicating that *late increasing attenders* experience a quicker deceleration in the likelihood of being arrested officially over time. Given the trajectory characteristics, *late increasing attenders* have a relatively low frequency of religious participation until the age of 18-20 before experiencing a steady increase. Thus, the odds of official arrest initially increase more and then decelerate quicker among individuals who report an initial low but overall increase in the frequency of religious attendance.

Alternatively, the trajectory group of *early declining attenders* shows a negative

linear slope and a positive quadratic slope, indicating that *early declining attenders* follow a smaller initial increase and a slower subsequent deceleration in the likelihood of being arrested officially. *Early declining attenders* attend religious services at a relatively high frequency at baseline (aged 14-16), but experience a rapid decline in religious participation one year later (aged 15-17). Accordingly, the odds of official arrest initially increase less and then decelerate slower among individuals who possess an initial higher and overall decrease in the frequency of religious attendance over time.

Given the older cohort group, the trajectory group of *declining-increasing-declining attenders* is positively associated with the linear slope, indicating the trajectory group increases the likelihood of official arrest at a greater rate over time compared to *non-attenders*. In addition, this trajectory group is negatively associated with the quadratic slope, indicating that these attenders experience a quicker deceleration in the likelihood of being arrested officially over time. *Declining-increasing-declining attenders* have a low frequency of religious attendance at the age of 17-19 with a slight decrease within the first interview year, and then experience a steady increase in religious participation throughout adolescence until the age of 22-24 when religious participation starts to decrease (but still keep a relatively high frequency of attendance). Thus, the odds of being involved in official arrest initially increase more and then decelerate quicker among individuals who possess an initial decrease followed by a subsequent increase in the frequency of religious attendance over time.

Religious Importance

In the younger cohort group, there are no significant differences among trajectory groups of religious importance regarding the initial level and the rate of change in the

likelihood of being involved in official arrest. In the older cohort group, the trajectory group of *gradual increasing* is positively associated with the initial likelihood of official arrest, which indicates that the *gradual increasing* group has a relatively higher likelihood of being arrested officially in the initial level compared to the *stable low* group. Although the trajectory group experiences a gradual increase in religious salience over time, it holds a low initial level of religious importance. Not surprisingly, individuals in the trajectory group of *gradual increasing* have 7.15 times higher likelihood of engaging in official arrest in the initial level compared to those in the group of *stable low*.

In addition, the *medium declining* group is negatively associated with the linear slope, indicating the trajectory group increases the likelihood of official arrest at a smaller rate over time compared to the group of *stable low*. The trajectory group is also positively related to the quadratic slope, indicating that it experiences a slower deceleration in the likelihood of being arrested officially over time. Given the trajectory of *medium declining*, the odds of official arrest increase less initially and decelerate slower subsequently among individuals who hold an initial high and overall decrease of religious importance than those who maintain low levels of religious importance over time. Similarly, the trajectory groups of *stable high* and *stable medium* experience a smaller initial rate of increase and a slower subsequent deceleration in the likelihood of being involved in official arrest over time.

Spirituality

As with spirituality of the younger cohort group, there are no significant differences among trajectory groups of spirituality regarding the initial level and the rate of change in the likelihood of being involved in official arrest. With respect to that of the older cohort group, the group of *medium-high increasing* is positively associated with the initial level

of official arrest, indicating that this trajectory group has a relatively higher likelihood of engaging in official arrest in the initial level compared to the *stable low* group. Given that the trajectory group of *medium-high increasing* tends to have initial higher levels of spirituality relative to the *stable low* group, it is unexpected that the odds of being involved in official arrest would be 4.63 times higher.

Alcohol Use

The multiple-group GCM of each dimension of religiosity and alcohol use with a quadratic function is estimated in both cohort groups respectively. As discussed above, the growth of alcohol use follows the trajectory exhibiting an initial increase and a subsequent acceleration for both cohort groups.

Religious Attendance

With respect to the younger cohort group, the trajectory group of *early declining attenders* is negatively related to the initial level of alcohol use, indicating that *early declining attenders* have lower initial levels of alcohol use compared to *non-attenders*. Given that *early declining attenders* have an initial higher frequency of religious attendance relative to *non-attenders*, it is no surprise that these attenders have lower levels of alcohol use in the initial level.

Given the older cohort group, the trajectory group of *early declining attenders* is marginally and positively related to the linear slope of alcohol use, indicating that *early declining attenders* experience a greater rate of increase in alcohol use compared to *non-attenders*. Given that *early declining attenders* experience an overall decreased frequency of religious attendance, they increase the levels of alcohol use more so than those who maintain a low frequency of religious attendance. In addition, the trajectory group of *late*

increasing attenders is marginally and positively associated with the quadratic slope, indicating that these attenders experience a slower acceleration on alcohol use over time compared to *non-attenders*. Given that *late increasing attenders* experience an overall increase in the frequency of religious attendance, the levels of alcohol use accelerate slower relative to those who maintain a low frequency of religious attendance over time.

Religious Importance

For the younger cohort group, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant, indicating that there are no significant differences among trajectory groups of religious importance regarding the initial level and the rate of change in alcohol use. For the older cohort group, only the group of *late declining* is negatively related to the initial level of alcohol use, indicating that the *late declining* group has lower initial levels of alcohol use compared to the *stable low* group. Given initial higher levels of religious importance relative to the group of *stable low*, individuals in the trajectory group of *late declining* should reasonably have lower levels of alcohol use.

Spirituality

For both cohort groups, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant, indicating that there are no significant differences among trajectory groups of spirituality regarding the initial level and the rate of change in the levels of alcohol use.

Cigarette Smoking

The multiple-group GCM of each dimension of religiosity and cigarette smoking with a quadratic function is estimated in both cohort groups respectively. As discussed

above, the growth of cigarette smoking follows the trajectory exhibiting an initial increase and a subsequent decrease for both cohort groups.

Religious Attendance

For the younger cohort group, the trajectory group of *gradual increasing attenders* is positively associated with the initial level of cigarette smoking, indicating that *gradual increasing attenders* have higher initial levels of cigarette smoking compared to *non-attenders*. Given the initial lower frequency of religious attendance, *gradual increasing attenders* thus have higher levels of cigarette smoking in the initial level.

In addition, the linear slope of *gradual increasing attenders* is significantly negative, indicating that *gradual increasing attenders* increase their rate of cigarette smoking less so than *non-attenders* do. This trajectory group is positively associated with the quadratic slope, indicating that it exhibits a slower deceleration in cigarette smoking over time. Considering the characteristics of g*radual increasing attenders*, these attenders have a low frequency of religious attendance at the age of 14-16, and then experience a steady increase in religious attendance throughout adolescence until the age of 19-21 when religious attendance starts to decrease. Accordingly, the levels of cigarette smoking initially increase less and then decelerate slower among individuals who experience an overall increase followed by a slight subsequent decrease in the frequency of religious attendance.

Similarly, the trajectory group of *frequent attenders* negatively predicts the linear slope of cigarette smoking, but positively predicts the quadratic slope of cigarette smoking. This result indicates that *frequent attenders* follow a smaller rate of increase and a subsequent slower deceleration in cigarette smoking than *non-attenders*. Because *frequent*

attenders have quite stable and higher levels of religious attendance, it makes sense that an initial rate of increase would be smaller, but a subsequent rate of decrease may not be greater. Other groups do no significantly differ from *non-attenders* in terms of the initial level and growth slope of cigarette smoking.

For the older cohort group, only the trajectory group of *frequent attenders* is negatively associated with the initial level of cigarette smoking, which indicates that *frequent attenders* have lower initial levels of cigarette smoking compared to *non-attenders*. Given an initial higher frequency of religious attendance relative to *non-attenders*, it is no surprise that *frequent attenders* would smoke cigarette less often in the initial level. With respect to the trajectory group of *increasing-declining-increasing attenders*, it is related to the linear slope negatively and the quadratic slope positively, indicating that these attenders experience a smaller initial rate of increase and a slower subsequent deceleration in the levels of cigarette smoking. Given the growth characteristics of *increasing-declining-increasing attenders*, individuals attend religious services at a low frequent rate at the age of 17-19, but experience a rapid increase in religious attendance until the age of 19-21, and then experience a steady decline in religious attendance until the age of 22-24 when religious participation starts to increase slightly. Accordingly, the levels of cigarette smoking initially increase less and then decelerate slower among individuals who report an initial increase and a subsequent decrease in the frequency of religious attendance.

Religious Importance

For the younger cohort group, the trajectory group of *stable high* is negatively associated with the linear slope of cigarette smoking, indicating that individuals in this

group experience a smaller initial rate of increase in the levels of cigarette smoking than those in the *stable low* group. In addition, the *stable high* group is positively associated with the quadratic slope, suggesting that the trajectory group exhibits a subsequent slower deceleration in the use of cigarette over time. Like *frequent attenders*, individuals with a flatter trajectory of religious importance are associated with a smaller growth trajectory of cigarette smoking.

For the older cohort group, the *early increasing* group is marginally and negatively associated with the linear slope of cigarette smoking, indicating a smaller initial rate of increase in cigarette smoking than the *stable low* group. In addition, the group of *early increasing* is positively associated with the quadratic slope, suggesting a slower subsequent deceleration in cigarette smoking over time. Individuals in this trajectory group have a relatively medium level of religious importance at baseline, and then experience a steady increase throughout young adulthood until the age of 21-24 when whose religious importance remains relatively stable high. Accordingly, the levels of cigarette smoking increase less initially and decelerate slower subsequently among individuals who hold the overall increased but with subsequent stable high levels of religious importance than those who maintain the belief that religion is not at all important in their life over time.

Spirituality

Given spirituality in the younger cohort group, the trajectory group of *medium-high increasing* is negatively associated with the linear slope, indicating that individuals in this group experience a smaller initial rate of increase in cigarette smoking than those in the group of *stable low*. In addition, the group of *medium-high increasing* is positively associated with the quadratic slope, suggesting a slower subsequent deceleration in the

levels of cigarette smoking over time. Given the trajectory of *medium-high increasing*, the levels of cigarette use increase less initially and decelerate slower subsequently among individuals who have an overall increase in spirituality than those who maintain low spirituality over time. Similarly, the trajectory group of *stable high* significantly negatively predicts the linear slope but positively predicts the quadratic slope of cigarette smoking. This result indicates that individuals in this trajectory group follow a smaller initial rate of increase and a subsequent slower deceleration in the levels of cigarette smoking than those in the group of *stable low*. Other groups do not significantly differ from the *stable low* group in terms of initial level or growth slope of cigarette smoking.

Alternatively, in the older cohort group, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant, which suggests that there are no significant differences among trajectory groups of spirituality regarding the initial level and the rate of change in the levels of cigarette smoking.

Marijuana Use

The multiple-group GCM of each dimension of religiosity and marijuana use is estimated for the younger cohort group with a linear function and for the older cohort group with a quadratic function. As discussed above, marijuana use follows the trajectory of a linear increase in the younger cohort group, but follows the trajectory exhibiting an initial decrease and a subsequent upward in the older cohort group.

Religious Attendance

For the younger cohort group, both trajectory groups of *early declining attenders* and *gradual declining attenders* are negatively associated with the initial level of marijuana use, indicating that both groups have lower initial levels of marijuana use compared to *non-*

attenders. Given an initial higher frequency of religious attendance, these attenders should reasonably use marijuana less often in the initial level relative to those who maintain a low frequency of attendance at religious service.

For the older cohort group, the trajectory group of *late increasing attenders* is positively associated with the initial level of marijuana use, indicating that *late increasing attenders* have higher initial levels of marijuana use compared to *non-attenders*. Although *late increasing attenders* follow an overall increased frequency of religious attendance, their initial levels of attendance at religious service are quite low. Not surprisingly, these attenders would use marijuana less often in the initial level than those who maintain lower frequencies of religious attendance.

In addition, the linear slope of *late increasing attenders* is negative, indicating that these attenders experience a smaller initial rate of decrease in marijuana use than *non-attenders*. The trajectory group of *late increasing attenders* is also positively associated with the quadratic slope, indicating that this trajectory group follows a slower subsequent acceleration in the levels of marijuana use over time. Taken together, *late increasing attenders* following the overall increased with an initial low frequency of religious attendance experience a smaller initial decrease in use of marijuana followed by a slower subsequent acceleration.

Alternatively, the trajectory group of *early declining attenders* is somewhat related to the linear slope positively and the quadratic slope negatively for marijuana use. These relationships indicate that *early declining attenders* experience a greater initial rate of decrease and a subsequent quicker acceleration in marijuana use than *non-attenders*. That is, the levels of marijuana use initially decrease more and then accelerate quicker among

individuals who experience an initial higher and overall decreased frequency of religious attendance.

Religious Importance

For the younger cohort group, the trajectory group of *gradual declining* is negatively associated with the initial level of marijuana use, indicating that individuals in this group have lower initial levels of marijuana use compared to the *stable low* group. The linear slope of *gradual declining* is positive, indicating a greater rate of increase in marijuana use than the *stable low* group. Given initial higher levels of religious importance relative to the *stable low* group, individuals in the trajectory group of *gradual declining* should reasonably have lower levels of marijuana use. In addition, individuals who possess an overall decrease in levels of religious importance increase the use of marijuana more than those who maintain low levels of religious importance over time.

In the older cohort group, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant. This suggests that there are no significant differences among trajectory groups of religious importance regarding the initial level and the rate of change in marijuana use.

Spirituality

For the younger cohort group, the coefficient estimates of the intercept, linear slope, and quadratic slope are not statistically significant, indicating that there are no significant differences among trajectory groups of spirituality regarding the initial level and the rate of change in the levels of marijuana use.

For the older cohort group, the trajectory group of *high-medium declining* is marginally and negatively associated with the initial level of marijuana use, indicating that

this trajectory group exhibits lower initial levels of marijuana use compared to the *stable low* group. Given initial higher levels of spirituality, it is no surprise that individuals whose spirituality following the trajectory of *high-medium declining* use marijuana less often than those who sustain low levels of spirituality over time. In addition, the *medium-low declining* group is negatively associated with the quadratic slope, indicating that the *medium-low declining* group experiences a quicker acceleration in marijuana use over time. The trajectory group includes individuals who tend to have medium levels of spirituality at baseline and then experience a steady decrease into low levels of spirituality. Accordingly, individuals who report an overall decrease of spirituality accelerate the levels of marijuana use more than those whose spirituality remains stable low over time.

Hard Drug Use

The multiple-group GCM of each dimension of religiosity and hard drug use with a linear function is estimated in both cohort groups respectively. As suggested, hard drug use follows the decreasing trajectory for both cohort groups.

Religious Attendance

With respect to religious attendance in the younger cohort group, the trajectory groups of *parabolic attenders*, *early declining attenders*, *frequent attenders*, and *gradual declining attenders* are negatively associated with the initial level of hard drug use. These results indicate that these attenders have a relatively lower likelihood of using hard drugs in the initial level compared to *non-attenders*. Given an initial higher frequency of religious attendance, the odds of hard drug use are 60.9% lower for *parabolic attenders*, 64.9% lower for *early declining attenders*, 55.2% lower for *frequent attenders*, and 47.1% lower for *gradual declining attenders*.

Given the older cohort group, the trajectory group of *late increasing attenders* is positively associated with the initial level of hard drug use, indicating that *late increasing attenders* have a relatively higher likelihood of using hard drugs in the initial level compared to *non-attenders*. Given an initial low frequency of religious attendance, *late increasing attenders* thus have 2.75 times greater likelihood of engaging in hard drug use than those who maintain a low frequency of religious attendance.

Religious Importance

As with religious importance of the younger cohort group, the group of *late declining* is negatively associated with the linear slope of hard drug use, indicating a slower rate of decrease in the likelihood of being involved in hard drug use compared to the *stable low* group. Although individuals in the trajectory group of *late declining* maintain a relatively high level of religious importance in the first four years, they actually experience a gradual decline after that. As such, the odds of engaging in hard drug use decrease less among individuals who hold an overall decrease of religious importance than those whose religious importance remains stable low over time.

Considering the older cohort group, the group of *medium declining* is marginally and negatively associated with the linear slope of hard drug use, indicating a smaller rate of decrease in the likelihood of hard drug use compared to the *stable low* group. Given the overall decreased levels of religious importance, individuals in the group of *medium declining* decrease the odds of using hard drug less than those who maintain the belief that religion is not at all important over time.

Spirituality

Given spirituality in the younger cohort group, the trajectory group of *medium-low*

declining is marginally and negatively associated with the linear slope of hard drug use, indicating the group exhibits a smaller rate of decrease in the likelihood of being involved in hard drug use compared to the group of *stable low*. Given the older cohort group, the trajectory group of *high-medium declining* is also negatively associated with the linear slope of hard drug use, indicating that individuals in this group experience a smaller rate of decrease in the likelihood of engaging in hard drug use compared to those in the group of *stable low*. Individuals in the trajectory group of *medium-low declining* tend to have medium or high levels of spirituality at baseline and then experience a steady decrease into low levels of spirituality. Individuals in the *high-medium declining* trajectory group whose spirituality remains stable high in the first four years before experiencing a gradual decline into medium or low levels throughout the remainder of the observed life course. It shows that these two trajectory groups share similar overall patterns of declining. Taken together, individuals who hold an overall decrease of spirituality decrease the odds of hard drug use less than those who maintain low levels of spirituality over time.

CHAPTER 5

DISCUSSION

Despite the recent emphasis on longitudinal research, the number of quality longitudinal studies are insufficient such that knowledge about the relationship between changes in both religiosity and crime over time still remains limited. This dissertation aims to add to the existing body of literature on this relationship and fill the gaps in prior studies by examining the religiosity-crime relationship in a sample of adjudicated adolescents through the use of the Pathways to Desistance Study, a seven-year longitudinal dataset. Using GBTMs and multiple-group GCMs, this dissertation identifies different developmental trajectories of religious attendance, religious importance, and spirituality and their relationships with changes in different types of substance use and criminal behavior respectively. This chapter includes a summary and discussion of the results from the dissertation. The limitations of the dissertation and future directions for research are also addressed. Finally, the implications of the dissertation for faith-based intervention programs are further discussed.

5.1 SUMMARY AND DISCUSSION OF RESULTS

Given the initial levels of substance use and criminal behavior, the relationships between religiosity and crime/deviance are dependent on different dimensions of religiosity and forms of crime and deviance. Religious attendance is strongly related to cigarette smoking, marijuana and hard drug use in the younger cohort group. In addition to

these forms of substance use, religious attendance in the older cohort group is also significantly associated with income-related offenses. Religious importance is significantly related to marijuana use in the younger cohort group, as well as official arrest and alcohol use in the older cohort group. Spirituality has no relationship with crime and deviance in the younger cohort group, but has a significant relationship with official arrest in the older cohort group. Overall, it appears that organizational religiosity, the behavioral dimension of religiosity—religious attendance—is more strongly associated with the likelihood of being involved in substance use than other dimensions of religiosity in both cohort groups. In addition, intrinsic religiosity—religious importance and spirituality—in the older cohort group seems to have stronger relationships with the odds of official arrest.

In all cases of statistical significance, the direction of the relationships is as expected, indicating negative relationships between different dimensions of religiosity and types of crime and deviance. The results show that offenders with higher religiosity have a lower likelihood of engaging in substance use and criminal behavior than those who are less religious or nonreligious, regardless of the dimensions of religiosity. These findings are consistent with previous studies (e.g., Bakken, Gunter, & Visher, 2013; Chu, 2007; Desmond et al., 2010; Giordano et al., 2008; Hill & Pollock, 2015; Laird et al., 2011; Salas-Wright et al., 2014), suggesting that both organizational and intrinsic religiosity may work as protective factors against particular expressions of substance use and criminal behavior. Religiosity may increase one's self-control, enhance the relationships with prosocial peers/mentors, and serve as an informal social control, a prosocial coping mechanism, and a turning point that assists in inhibiting offenders from substance use and criminal behavior (Adamczyk & Palmer, 2008; Giordano et al., 2008; Glanville et al., 2008; Johnson &

Morris, 2008; McCullough & Willoughby, 2009). In addition, offenders who increase their religiosity from a low level are significantly more prone to engage in substance use and criminal behavior at the beginning of the observed time period. Although these trajectory groups experience a gradual increase in religiosity over time, they all hold low initial levels of religiosity. Not surprisingly, individuals in these groups may have a higher risk for substance use and criminal behavior initially.

When it comes to changes in religiosity, it appears that only a few trajectory groups of religiosity predict several growth patterns of substance use and criminal behavior. Given this fact, these results must be viewed with caution. Not all trajectory groups of religious attendance, religious importance, and spirituality are significantly associated with each type of substance use and criminal behavior. For those significant dynamic relationships, they are quite diffuse without significant patterns. It is not very clear which dimensions of changing religiosity are more strongly associated with which types of changing crime and deviance. However, it seems as though more limited findings regarding the relationship between changes in both religiosity and crime and deviance emerge for the younger cohort than the older cohort. That is, changes in religiosity may matter more for offenders in the older cohort group with respect to changes in substance use and criminal behavior. This may be explained by the nature of religious attendance and the degree of religious commitment and beliefs at different periods of the life course.

Specifically, younger offenders may attend religious services more because of coercion from family members or significant others and less because of their willingness or commitment to religious beliefs (Rhodes & Reiss, 1970). Nevertheless, spending time with family and friends involved in religious activities may provide an external locus of

control oriented toward their behavior, limiting opportunities for deviant or criminal activities (Evans et al., 1996). As individuals age, older offenders' religious involvement may be less dependent on others' expectations (Koenig et al., 2008). They may be more prone to internalize the salience of their beliefs into their decision making and behaviors (Yonker et al., 2012), since that they may come to have a stronger sense of identity and self-awareness and capacity for cognitive complexity (Arnett, 2007). Likewise, the self-control related to religiosity may matter more for older offenders in regulating deviant behaviors as their developed brain allows for better maturity of judgment than for younger offenders (Yonker et al., 2012). Overall, religiosity may carry more impact in the older cohort group. That is, the decreased risk of crime and deviance may be not only because of an increased attendance at religious services that provide social control over offenders' behavior, but also due to an increased level of religious commitment and beliefs that are explicitly proscriptive for crime and deviance.

For those trajectory groups of religiosity showing significant relationships with changing crime/deviance, they generally show similar temporally dynamic associations between changes in both religiosity and crime/deviance. Most importantly, the findings regarding these emerged relationships are consistent despite the confounding variables controlled. This to some extent suggests that the differences regarding the growth trajectory of substance use and criminal behavior are actually associated with the trajectory groups of religiosity, rather than other controlled variables within serious offenders.

With respect to the dynamic relationships, the results generally show that an increase in religiosity is associated with a greater decrease or a smaller increase in substance use and criminal behavior over time. A decrease in religiosity is associated with

a smaller decrease or a greater increase in substance use and criminal behavior over time. In other words, offenders who decrease in religiosity over time are significantly more likely to increase the risk of substance use and criminal behavior, compared to counterparts who maintain low levels of religiosity over time. On the other hand, offenders who increase in religiosity are significantly more likely to decrease the tendency to be involved in substance use and criminal behavior, relative to those who are stable and long-term irreligious. Therefore, it appears that losing one's religion contributes to an increase in substance use and criminal behavior, while gaining one's religion leads to a decrease in substance use and criminal behavior. Notably, the relationships with growth patterns of crime and deviance are impacted by the degree of change in religiosity, particularly for spirituality which shows a subtle change of increase and/or decrease over time. That is, in addition to the overall trajectory of decline in religiosity, a small range of gains and losses in religiosity, approximately within low and medium levels, over a seven-year period to some extent may increase the likelihood of several outcomes, such as aggressive and total offending.

In addition, offenders whose religiosity trajectory is closer to a flat line (i.e., had less of a decrease or an increase) are less likely to experience a change in the use of a variety of substances or the involvement of criminal behavior. Notably, relative to those who have stable low levels of religiosity, offenders who maintain relatively high levels of religiosity over a seven-year period report a smaller growth change in substance use and criminal behavior. For instance, highly religious offenders smoke cigarettes less often than irreligious offenders do at the beginning of the cigarette smoking trajectory. While offenders, on average, follow an initial increase and a subsequent decrease in cigarette

smoking, highly religious offenders are unlikely to experience an increase in cigarette smoking over time. Overall, the deterrence effects are clearly evident among offenders with unchanging high religiosity for whom religiosity continues to impede substance use and criminal behavior. That is, no appreciable increase would be observed from a low initial risk of crime and deviance.

Given many difficulties offenders may encounter after release, it is well understood that many of them will surrender to immense pressures and stresses that come with a conventional lifestyle, making desistance extremely challenging. Religiosity may provide these offenders with both social support and psychological/emotional comfort during this stressful and chaotic time, assisting them in rebuilding their lives. In addition, "becoming spiritually centered can provide a sense of clarity for these offenders in actively choosing to forgive their prior transgressions, to hope for a better future through the use of religious guidance, and to fill the void left by substance use with a higher power" (Bakken, Gunter, & Visher, 2013, p. 14).

Being considered as an institution or form of social capital, religion can deter "the individual from realizing his/her natural proclivities to criminal activity" (Chu, 2007; Giordano et al., 2008, p. 101). Involvement in religious activities can keep offenders from later crime because it occupies otherwise free time to become involved in crime activities, imposes standards and guidelines of moral and righteous behavior, enhances the relationships with conventionally oriented peers and mentors, and provides positive social and coping skills that help to avoid or overcome stress and strain in the life (Agnew, 2006; Desmond et al., 2010; Glanville et al., 2008; Petts, 2009a). As such, the reduction of religious participation to some extent may reflect the loss of relevant positive social

support/control and coping strategies that may continue to keep offenders away from criminal activities as they age.

In addition, religiosity, particularly intrinsic religiosity (e.g., religious importance or spirituality) may promote a healthy self-concept/control (McCullough & Willoughby, 2009; Saroglou, 2011), enhance a sense of self-forgiveness, and facilitate the development of new prosocial identities (Maruna, 2001; Terry, 2003). Conversely, alterations in religious beliefs and spirituality tied to feelings of purpose and meaning in life may contribute to a less positive self-concept/control. Offenders may therefore be less likely to forgive themselves for the things they have done wrong inhibiting a transformative change in an offender's identity to a prosocial identity and motivations for being good. The loss of religiosity may become the potential risk for criminal involvement. Taken together, the effect of declining religiosity may seem straightforward. Religiosity is protective, so it is reasonable that a decreased level of religiosity results in an increase in the risk of substance use and criminal behavior.

Furthermore, there may be other factors contributing to the elevated risk of substance use and criminal behavior for the declining trajectory groups of religiosity. The fact is that the studied sample covers the developmental period transitioning from adolescence to young adulthood. This transitional time of life is associated with increased social, legal and ideological freedom. Many emerging adults become more independent of their parents, seeking personal autonomy, personal identity, and self-determination (Feldman & Elliott, 1993). Formatting a personal identity that is separate from others often leads emerging adults to reject and rebel against parental values, including religious beliefs (Leonard et al., 2013; Sabatelli & Mazor, 1985). This formation of personal identity, which

occurs simultaneously with leaving the family and home for the first time, is also a time of increased risk for being involved in substance use and criminal behavior (Moscati & Mezuk, 2014). Although higher religiosity may attenuate this increase (White et al., 2006), those who reject their parents' beliefs entirely and leave their homes may not maintain this protective effect. In addition, if religious involvement continues to decline, the social support parents provide to their children may be decreased accordingly due to incompatible beliefs. Such belief conflict may further weaken parent-child relationships, increase family conflict, and contribute to higher delinquency and crime among adolescents (Gervais et al., 2011; Pearce & Haynie, 2004). Although not explicitly tested, it is highly possible that one mechanism contributing to the increased risk triggered by a decline in religiosity is attributed to the loss of certain direct and indirect protective factors that make up the multidimensional nature of religiosity as well as the potential reaction to this loss.

There may be alternative explanations regarding the fact that among individuals whose high religiosity later decreases, crime increases beyond the level expected by simply the cessation of religious deterrence. That is, high religiosity deters crime at an earlier point in time that it tends to amplify crime when this religiosity later decreases. As Charles et al. (1985) suggested, this additional deviance-amplifying effect may be attributed to two forces: delay in entering the typical age-related crime sequence (i.e., age-crime curve) and attempts to compensate for a previous lack of subculturally desirable but illegal behavior.

In the typical age-crime curve, the prevalence of offending tends to increase from late childhood, peaks in the teenage years (around ages 15-19), and then declines from the early 20s (Greenberg, 1977; Farrington, 1986; Tremblay & Nagin, 2005). To the degree that religiosity restrains crime, high religiosity during early adolescence should delay entry

of adolescents into this sequence. As their religiosity later declines, commencement of this sequence is more likely, but they would start it later. Because their peak years of crime would occur after those with an initial low religiosity, their current level of crime would be amplified later. Efforts to compensate for a former relative lack of crime may also explain later higher levels of crime among initially religious adolescents. As such, "a decrease from prior high religiosity not only removes a previous deterrent but also may provoke an effort to "make up for lost time." Once freed from this deterrent, youth may compensate by oversampling the proverbial "fruits of sin."" (Charles et al., 1985, p. 121).

On the other hand, the reduction of substance use and criminal behavior among offenders whose religiosity increases indicates the continuity of religious deterrence. As discussed above, emerging adults are caught in rapidly changing contexts, including but not limited to the decreased social control and support from parents, dramatic life-events, and evolving identity, that may increase the risk of delinquency and crime (Arnett, 2000). Being active in a religious community may still provide positive social support and control to emerging adults, increasing the probability of following a trajectory of low-level crime throughout adolescence to young adulthood (Petts, 2009a). In addition, the continued increase of religiosity to some extent reflecting the consistent beliefs and less alterations in beliefs, may serve as an additional protective mechanism or coping strategy responding to the loss of certain direct and indirect protective factors due to changing life and social experiences. Not surprisingly, the gradual increase of religiosity may continue to attenuate the increased risk of being involved in substance use and criminal behavior during emerging adulthood.

Given the potential protective effect of religiosity, the increased likelihood of

engagement in self-reported offending among those who possess a moderate gain in spirituality (i.e., increase from low spirituality to medium spirituality) may seem counter-intuitive. Religiosity developed in adulthood is less dependent on others' expectations, but instead depends on the commitment to religion and internalization of religious beliefs on their own volition (Koenig et al., 2008). However, as Diener et al. (2011) pointed out, religiosity is sometimes accompanied by difficult life circumstances. With respect to those who experience a gain in religiosity over time, the increased religiosity may signify the possibility to cope with stressful life events and stimuli that often result in substance use and criminal behavior as well (e.g., Jang & Johnson, 2003, 2005; Johnson & Morris, 2008; Wills et al., 2003).

Taylor (2002) suggests that there are many parallels between substance dependence and addictive involvement with religion. In certain ways, religiosity, a habit of thought, used for coping with difficult circumstances and seeking for life enhancement analogous to those behavioral habits like substance use. The substantial difference may be that religiosity to some extent reflects positive meaning in one's life. As such, the mechanism of an increase in religiosity contributes to the increased risk of crime may align with reasons that individuals seek religion in adulthood to counteract the risk factors for crime. Additionally, this small increase in spirituality to some extent shows that offenders in this trajectory do not actually have strong commitment to religion. The increased spirituality may just be for seeking help from religion to reduce the stress from life circumstances.

Although most adolescents, as they age, mature out of their illicit activities, if they ever engage in them, the predicted frequency of substance use and likelihood of criminal behavior seems lower for religious adolescents than for nonreligious adolescents. Overall,

the results of this dissertation suggest that religiosity is an important variable in predicting the trajectory of substance use and criminal behavior from adolescence to young adulthood. Religiosity may act as a protective factor that deters adolescents from substance use and criminal behavior. Gain in religiosity continues to attenuate the risk of being involved in substance use and criminal behavior. Loss in religiosity is associated with elevated risks of engagement in substance use and criminal behavior.

5.2 LIMITATIONS AND DIRECTIONS FOR FUTURE STUDIES

Although the findings extend previous research in many ways, there are several limitations inherent in the current dissertation. First, a measure of religious affiliation is not available in this dataset. As a result, it is impossible to investigate the role of religious affiliation in the explanation of crime among this sample of serious adolescent offenders. Considering that some fundamentalist groups (e.g., Christians and Mormons) are more inclined to be involved in crime than other denominations (e.g., Catholics) (Jensen & Erickson, 1979), the relationship between religiosity and crime may not be uniform across different religious denominations.

Second, some researchers argue that the configuration of the dimensions of religiosity at the individual level may be extremely complex that they cannot be captured in examining dimensions of religiosity in isolation or in combination (McGuire, 2008; Pearce, Foster, & Hardie, 2013). In order to capture how religious individuals may be, inductive statistical methods such as cluster or latent class analyses have been encouraged to identify distinct religious profiles—unique combinations of individual dimensions of religiosity—that are meaningful to individuals in their life, yet shared by many people (Park, Edmondson, & Hale-Smith, 2013; Pearce et al., 2013; Salas-Wright, Vaughn, &

Maynard, 2014). Employing this type of approach to model multifaceted religiosity, individuals may be classified into not only straightforward religious profiles such as irreligious and the highly organizationally or intrinsically involved, but also more nuanced profiles of religiosity, such as that of individuals with high subjective religiosity but little objective religious attendance or vice versa. Thus, in addition to the examination of changes in individual components of religiosity respectively, future studies need to assess the ways in which multifaceted religious profiles evolve over time when investigating the religiosity-crime link over time.

Third, previous studies have demonstrated that gender and race have been found to be associated with religiosity or crime. It is highly possible that religiosity's effect on crime would be gender- and race-specific. However, little is known about if the relationship between religiosity and crime over time varies across gender and race. In order to capture the longitudinal relationship between religiosity and crime, future studies need to evaluate group specific patterns of the religiosity-crime relationship through stratifying the sample by gender and race.

Fourth, including only serious offenders may limit the generalizability of the findings to other segments of offenders who commit less serious/minor offenses or the general/conventional population as a whole. For instance, it is highly possible that trajectory groups of either religiosity or crime identified in this dissertation may be extremely different if serious and minor offenders are both included for the investigation. Consequently, the relationship between religiosity and crime over time may be different. Thus, the findings of this dissertation may not be generalizable to a broader population. In addition, the generalizability of the findings is also relatively limited due to the small

sample size of female offenders. Further replications using a wider range of the population are needed.

Fifth, there is a lack of information about participants prior to adolescence and after early adulthood. The sample consists of offenders transitioning from adolescence to young adulthood, who are in a particularly sensitive time for the development of religiosity (Good & Willoughby, 2008). Therefore, the findings of this dissertation may be only specific to this developmental period, and it remains unclear whether or not changes in religiosity during childhood or adulthood are similarly associated with changes in crime. More research is needed that explores these associations from childhood through adulthood.

Sixth, although this dissertation is conducted within a longitudinal design, it emphasizes the contemporaneous effects of religiosity on crime. This dissertation is limited in its ability to make a causal inference for the effect of religiosity on crime. It is difficult to identify whether religiosity or crime comes first and then rule out the possibility of reverse causality (i.e., the impact of crime on religiosity). It is highly possible that religiosity may influence crime, alternatively, crime may influence religiosity. Future research is needed to explore the direction of the effect of religiosity on crime and possible reciprocal effects.

Finally, this dissertation includes a variety of factors based on existing theoretical perspectives, arguing that religiosity can impact crime through the effects of social bonds, social learning, self-control, copying strategies and turning points. However, it does not explicitly investigate the mechanisms that account for the effects of changes in religiosity on changes in crime. Further studies should focus on specifying the theoretical mechanisms that can explain the long-term effects of religiosity on trajectories of crime. In addition,

other life changes such as getting married and establishing a career may be much better predictors of desistance than developmental patterns of religiosity (Laub & Sampson, 2001). Religiosity may also have an impact on these developmental milestones (Bakken, Gunter, & Visher, 2013; Chu, 2007; Giordano et al., 2008; Schroeder & Frana, 2009). More research is needed to determine if religiosity may mediate or moderate these other life changes and, thereby, affect desistance from substance use and criminal behavior.

5.3 CONCLUSIONS AND IMPLICATIONS

Despite these limitations, this dissertation emphasizes changes of religiosity over time may have the potential to stimulate long-term behavioral changes away from crime and deviance. Although this dissertation does not specifically lead to a prevention strategy, it may make an important contribution by illustrating how changes in religiosity may be related to the trajectories of crime between adolescence and young adulthood. This knowledge may be useful in developing strategies to encourage at-risk adolescents to avoid delinquent and criminal behavior throughout adolescence into young adulthood.

Previous studies have consistently found there is an inverse though modest relationship between religiosity and crime. Although the findings of the dissertation are a bit mixed for certain trajectories, it generally indicates that religiosity may not only inhibit the initial levels of substance use and criminal behavior but also deter their continued involvement. These findings to some extent emphasize the important role religiosity plays in developing viable crime preventive and rehabilitative initiatives. Various aspects of religiosity may be incorporated with the prevention and rehabilitation of substance use and criminal behavior.

With respect to community-based interventions, the efficacy of these interventions

that is generally supported by researchers suggests that religious institutions as one important resource within communities cannot be ignored. One of the most important assets that the churches have is that they are located in the neighborhood (Branch, 2002). Religious institutions may provide necessary social support—not only spiritual and emotional support but also constructive advice and information, a platform to establish a positive appraisal of self-esteem and self-values, and a haven from various social problems that plague their communities (Taylor & Chatters, 1988; Chu & Sung, 2009). Accordingly, religious institutions in the community should be encouraged to develop various youth programs and deliver services to prevent at-risk adolescents from the onset of crime as well as reach out to individuals who have been involved in drug addiction and criminal behavior (Chu, 2007).

Given that released offenders face multiple challenges or difficulties when they return to their families and communities, it seems extremely challenging for many offenders to desist from substance use and crime. A strong sense of religiosity may serve as a guide for coping with the tumultuous life situations and circumstances that released offenders may encounter, "such as dealing with issues relating to substance use, unemployment, reconnecting with family and peers, and finding adequate housing" (Bakken et al., 2013, p.14). Religiosity may work as an important turning point in their lives, facilitating a shift in one's identify from an offender to an ex-offender, which can serve as a catalyst in the desistance process (Giordano et al., 2008). Religiosity can at the very least be the foundation from which they start to rebuild their lives, creating the potential to stimulate long-term behavioral change away from substance use and criminal behavior.

When considering the treatment of drug addicts and recidivists, the findings from this dissertation suggest that faith-based initiatives and programs may be considered as one of the viable options of interventions for individuals who are willing to participate while keeping other secular interventions available. These programs may provide both external social control and internal spiritual guidance that may initiate a transformative change in an offender's identity from an offender to an ex-offender (Bakken et al., 2013). In addition, the prosocial support, network and copying strategies derived from religiosity may be a potential resource that encourages desistance from drug abuse and recidivism. (Chu, 2007; Giordano et al., 2008; Schroeder & Frana, 2009). In addition, programs designed to introduce religiosity into serious offenders' lives, especially prison ministry programs, should take note of diverse dimensions of religiosity, including both intrinsic and organizational religiosity (Schroeder & Frana, 2009).

This dissertation provides a useful extension to the literature exploring the relationship between changes in both religiosity and crime, even though it is not quite clear which aspect of religiosity is more influential to an individual's trajectory of crime. The results of the exploratory dissertation suggest that strengthening, emphasizing, and reinforcing these elements of religiosity may increase the chances that religiosity may be a prosocial turning point in the lives of serious offenders. Religiosity may be an important resource for prevention of drug abuse and criminal behavior as well as rehabilitation from drug dependence and recidivism. More empirical research with comprehensive measures of religiosity will be needed to unravel the true relationship between changes in both religiosity and crime. Particularly, future research should be conducted to delineate if this relationship differs by developmental phase, thus providing specific guidance about how

faith-based programs can be reshaped toward targeted interventions during certain developmental periods to yield large-scale effects on crime reduction.

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APPENDIX A

LIST OF TOTAL, AGGRESSIVE, AND INCOME OFFENDING ITEMS

Total	Aggressive	Income	Offense
X	X		Destroyed/damaged property
X	X		Set fire to house/building/car/vacant lot
X		X	Entered building to steal
X		X	Shoplifted
X		X	Bought/received/sold stolen property
X		X	Used checks/credit cards illegally
X		X	Stolen car/motorcycle
X		X	Sold marijuana
X		X	Sold other illegal drugs
X			Carjacked someone
X			Drove drunk or high
X		X	Been paid by someone for sex
X	X		Forced someone to have sex
X	X		Killed someone
X	X		Shot someone (where bullet hit)
X	X		Shot at someone (pulled trigger)
X	X	X	Took something by force using weapon
X	X	X	Took something by force no weapon
X	X		Beaten up somebody badly needed doctor
X	X		Been in fight
X	X		Beaten up someone as part of gang
X			Carried a gun

APPENDIX B

MODEL SELECTION RESULTS OF RELIGIOSITY

Table B.1. Model Selection Results of Religious Attendance

	N	Polynomial Order (n)	BIC	LBF	APP Range
Younger Cohort Group (aged 14-16)					
	1	Cubic (1)	-9776.90		
	2	Cubic (2)	-9314.57	924.66	
	3	Cubic (3)	-9201.73	225.68	
	4	Cubic (4)	-9136.98	129.50	
	5	Cubic (5)	-9121.41	31.14	
	6	Cubic (6)	-9080.36	82.10	
	7	**Cubic (7)**	**-9074.01**	**12.70**	
	8	Cubic (8)	-9110.67	-73.32	
	9	Cubic (9)	-9088.98[a]	43.38	
	7	**Cubic (3), Quadratic (3), Linear (1)**	**-9069.25**	**9.52[b]**	**0.70-0.91**
Older Cohort Group (aged 17-19)					
	1	Cubic (1)	-5981.96		
	2	Cubic (2)	-5648.90	666.12	
	3	Cubic (3)	-5589.73	118.34	
	4	Cubic (4)	-5579.43	20.60	
	5	Cubic (5)	-5539.17	80.52	
	6	Cubic (6)	-5498.17	82.00	
	7	**Cubic (7)**	**-5483.66**	**29.02**	
	8	Cubic (8)	-5489.92[a]	-12.52	
	9	Cubic (9)	-5510.49[a]	-41.14	
	7	**Cubic (3), Quadratic (2), Linear (1), Intercept (1)**	**-5462.56**	**42.20[b]**	**0.72-0.92**

Notes: N=number of trajectory groups; n=number of each polynomial function; BIC=Bayesian information criterion; LBF= Log Bayes Factor; APP=Average Posterior Probabilities

[a] At least one of group size less than 5%

[b] The last model is compared to the seven-group model with all cubic function.

Table B.2. Model Selection Results of Religious Importance

	N	Polynomial Order (n)	BIC	LBF	APP Range
Younger Cohort Group (aged 14-16)					
	1	Cubic (1)	-10476.19		
	2	Cubic (2)	-9500.88	1950.62	
	3	Cubic (3)	-9253.24	495.28	
	4	Cubic (4)	-9165.38	175.72	
	5	Cubic (5)	-9163.54	3.68	
	6	Cubic (6)	-9144.58	37.92	
	7	**Cubic (7)**	**-9139.34**	**10.48**	
	8	Cubic (8)	-9132.10[a]	14.48	
	9	Cubic (9)	-9145.55	-26.90	
	7	**Quadratic (4), Linear (2), Intercept (1)**	**-9113.66**	**51.36[b]**	**.69-.90**
Older Cohort Group (aged 17-19)					
	1	Cubic (1)	-6397.04		
	2	Cubic (2)	-5787.75	1218.58	
	3	Cubic (3)	-5642.92	289.66	
	4	Cubic (4)	-5582.35	121.14	
	5	Cubic (5)	-5571.80	21.10	
	6	Cubic (6)	-5550.07	43.46	
	7	**Cubic (7)**	**-5543.53**	**13.08**	
	8	Cubic (8)	-5540.38[a]	6.30	
	9	Cubic (9)	-5538.52	3.72	
	7	**Quadratic (5), Intercept (2)**	**-5520.85**	**45.36[b]**	**.74-.89**

Notes: N=number of trajectory groups; n=number of each polynomial function; BIC=Bayesian information criterion; LBF= Log Bayes Factor; APP=Average Posterior Probabilities

[a] At least one of group size less than 5%

[b] The last model is compared to the seven-group model with all cubic function.

Table B.3. Model Selection Results of Spirituality

	N	Polynomial Order (n)	BIC	LBF	APP Range
Younger Cohort Group (aged 14-16)					
	1	Cubic (1)	-9941.41		
	2	Cubic (2)	-8917.88	2047.06	
	3	Cubic (3)	-8651.08	533.60	
	4	Cubic (4)	-8570.29	161.58	
	5	Cubic (5)	-8531.83	76.92	
	6	Cubic (6)	-8492.43	78.80	
	7	**Cubic (7)**	**-8486.03**	**12.80**	
	8	Cubic (8)	-8478.64[a]	14.78	
	9	Cubic (9)	-8483.04	-8.80	
	7	**Quadratic (1), Linear (4), Intercept (2)**	**-8440.79**	**90.48[b]**	**.74-.89**
Older Cohort Group (aged 17-19)					
	1	Cubic (1)	-6193.72		
	2	Cubic (2)	-5456.88	1473.68	
	3	Cubic (3)	-5252.45	408.86	
	4	Cubic (4)	-5205.07	94.76	
	5	Cubic (5)	-5194.51	21.12	
	6	Cubic (6)	-5172.97	43.08	
	7	**Cubic (7)**	**-5169.70**	**6.54**	
	8	Cubic (8)	-5162.15[a]	15.10	
	9	Cubic (9)	-5168.00	-11.70	
	7	**Cubic (2), Quadratic (3), Linear (1), Intercept (1)**	**-5145.60**	**48.20[b]**	**.79-.88**

Notes: N=number of trajectory groups; n=number of each polynomial function; BIC=Bayesian information criterion; LBF= Log Bayes Factor; APP=Average Posterior Probabilities

[a] At least one of group size less than 5%

[b] The last model is compared to the seven-group model with all cubic function.

APPENDIX C

MODEL SELECTION RESULTS OF UNCONDITIONAL GROWTH CURVE MODELS

Table C.1. Model Fit Statistics of Unconditional Growth Curve Models

Outcomes	Cohort groups	Model specification	Fit statistics							
			Loglikelihood	k	χ2(df)	TLI	CFI	RMSEA	SRMR	BIC
Criminal behavior										
Aggressive offending										
	Younger	Quadratic model	-3304.232	9						6640.365
		Linear model	-3415.766	5	223.068(4)***					6849.256
	Older	Quadratic model	-1911.363	9						3850.528
		Linear model	-2022.498	5	222.270(4)***					4060.442
Income-related offending										
	Younger	Quadratic model	-3124.094	9						6280.090
		Linear model	-3227.849	5	207.510(4)***					6473.422
	Older	Quadratic model	-1758.116	9						3544.034
		Linear model	-1840.783	5	165.334(4)***					3697.013
Total offending										
	Younger	Quadratic model	-3355.525	9						6742.951
		Linear model	-3468.070	5	225.090 (4)***					6953.863
	Older	Quadratic model	-1989.878	9						4007.559
		Linear model	-2072.658	5	165.560 (4)***					4160.761
Official arrest										
	Younger	Quadratic model	-3371.15	9						6774.202
		Linear model	-3404.518	5	66.736(4)***					6826.759
	Older	Quadratic model	-2064.533	9						4156.867
		Linear model	-2101.098	5	73.130(4)***					4217.641
Substance use										
Alcohol use										

	Younger	Quadratic model	-12678.906	17		.902	.906	.075	.069	25418.029
		Linear model	-12700.940	13	44.068(4)***	.892	.881	.078	.069	25447.928
	Older	Quadratic model	-7965.574	17		.881	.886	.080	.061	15983.664
		Linear model	-7991.905	13	52.662(4)***	.849	.833	.090	.086	16023.969
Cigarette smoking										
	Younger	Quadratic model	-15036.673	17		.918	.921	.088	.053	30133.603
		Linear model	-15083.745	13	94.144(4)***	.898	.887	.098	.071	30213.57
	Older	Quadratic model	-9180.024	17		.971	.972	.051	.036	18412.563
		Linear model	-9212.180	13	64.312(4)***	.940	.934	.073	.060	18464.519
Marijuana use										
	Younger	Quadratic model	-14394.544	17		.800	.807	.098	.088	28849.325
		Linear model	-14415.552	13	42.016(4)***	.801	.780	.097	.098	28877.168
	Older	Quadratic model	-8628.528	17		.847	.852	.083	.075	17309.539
		Linear model	-8655.396	13	53.736(4)***	.821	.802	.090	.101	17350.926
Hard drug use										
	Younger	Quadratic model	-2403.429	9						4838.747
		Linear model	-2410.188	5	13.518(4)**					4838.092
	Older	Quadratic model	-1484.620	9						2997.043
		Linear model	-1493.952	5	18.664(4)**					3003.349

Notes: ***p≤ 0.001, **p≤ 0.01, *p≤ 0.05, $^{+}$p<0.1 (two-tailed)

Table C.2. Estimated Mean Growth Parameters and Variance Components of Unconditional Growth Curve Models

Outcomes	Cohort groups	Model specification	Parameters					
			Means			Variances		
			Intercept	Linear	Quadratic	Intercept	Linear	Quadratic
Criminal behavior								
Aggressive offending								
	Younger	Quadratic model	0	-1.346***	.119***	.285**	.442***	.007***
	Older	Quadratic model	0	-1.649***	.161***	.183*	.935***	.017***
Income-related offending								
	Younger	Quadratic model	0	-1.302***	.120***	.193*	.865***	.016***
	Older	Quadratic model	0	-1.656***	.158***	.105	1.733***	.031***
Total offending								
	Younger	Quadratic model	0	-1.167***	.103***	.295***	.420***	.007***
	Older	Quadratic model	0	-1.241***	.112***	.141*	.834***	.014***
Official arrest								
	Younger	Quadratic model	0	.187**	-.050***	.337**	.147*	.005*
	Older	Quadratic model	0	.277**	-.071***	.409	.265*	.009*
Substance use								
Alcohol use								
	Younger	Quadratic model	2.319***	.030	.022***	2.027***	.330***	.005***
	Older	Quadratic model	2.693***	.002	.018*	2.238***	.695***	.011***
Cigarette smoking								
	Younger	Quadratic model	3.664***	.321***	-.010	6.239***	.910***	.017***
	Older	Quadratic model	4.351***	.332***	-.036***	7.498***	1.140***	.018***
Marijuana use								
	Younger	Quadratic model	2.867***	-.063	.013	2.357***	.611***	.007**
		Linear model	2.745***	.033^{+}		2.386***	.102***	
	Older	Quadratic model	3.484***	-.430***	.046***	3.066***	.566**	.010**
Hard drug use								

	Younger	Quadratic model	0	-.224	.006	7.454***	.883***	.013***
		Linear model	0	-.202***		5.608***	.144***	
	Older	Quadratic model	0	-.317	-.004	8.028***	1.599**	.022*
		Linear model	0	-.389***		4.125***	.172***	

Notes: ***$p \leq 0.001$, **$p \leq 0.01$, *$p \leq 0.05$, $^{+}p < 0.1$ (two-tailed)